

February 7, 1957

The IRON AGE

The National Metalworking Weekly



Eugene B. Mapel

Special Report on Marketing

How To Choose A Management Consultant P.59

Equipment Makers Gear For Road Program P.62

Stamping: Do Your Dies Qualify For The Job? P.99

Digest of the Week P-2

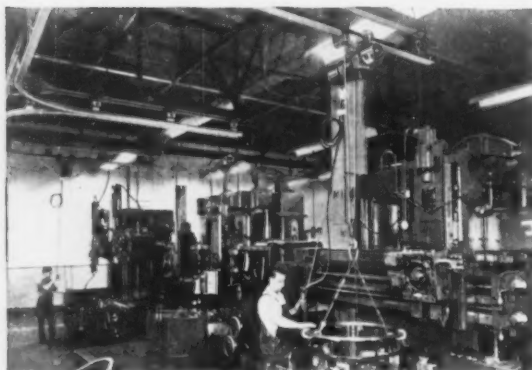
Trambeam Handles it Overhead



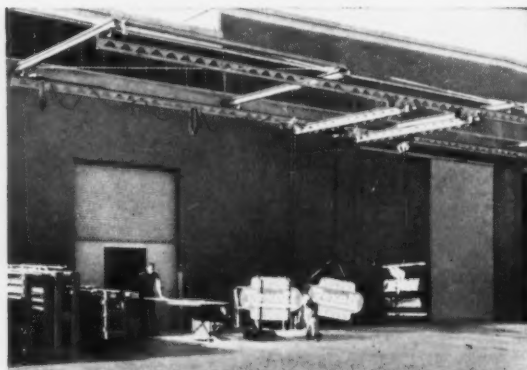
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This pump rotor, fabricated from Bethlehem plates, is made to rigid dimensional specifications in order to control pumping action, balance and heavy intermittent loadings. Here, in the Acme Welding Division of United Tool & Die Co., Hartford, Conn., the rotor blades, pre-cut from $\frac{5}{8}$ in. Bethlehem plates, are welded in place. The uniform quality of Bethlehem plates makes them ideally suited for fabricating intricate weldments. Bethlehem plates, together with the use of good welding technique, give assurance of sound welds. They come in a full range of sheared and universal-mill sizes.

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Feb. 7, 1957—Vol. 179, No. 6

The IRON AGE

Digest of the Week in Metalworking

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NEWS DEVELOPMENTS

ROADBUILDING EQUIPMENT MAKERS START TO ROLL P. 62

The Federal roadbuilding program plus good prospects for foreign sales, are touching off an era of prosperity



for equipment makers. All are introducing bigger and better equipment. Yet there are some danger signs. Contractors, for one, show a high rate of failure.

INDUSTRIAL HEATING LOOKS FOR A GOOD YEAR P. 63

It won't top 1956, a record year, but industrial heating equipment makers are confident that 1957 will be a good year. MAI man urges a closer look at tax depreciation methods and policy

CAN A SICK STEEL COMPANY MAKE COMEBACK? P. 64

Jessop Steel Co. has proposed a plan of reorganization for Green River Steel Co. Jessop management thinks it has the formula to make it click. Will push sales and service.

STRONG 4TH QUARTER AIDED '56 EARNINGS P. 65

While it didn't match 1955, last year was a good one for sales and earnings. Brisk fourth quarter, setting records in most cases, was big asset. Producers are optimistic.



Brooks Edler Photo

CONSULTANTS — Marketing problems are too broad for many small firms to cope with alone. A consultant frequently must be called in. But how can management be sure the consultant knows what he is talking about? A special report (P. 59) by Eugene B. Mapel, tells how to pick the right man.

STRIKE WAS COSTLY, BUT HAD BRIGHT SPOTS P. 68

Westinghouse reveals billings in 1956, year of the strike, about \$500 million under estimates for 1957. However, silver lining is more competitive wage scale, better labor understanding. Company feels it is well along on the comeback trail. Appliance sales show exceptional strength.

HOW TO AVOID DAMP ELECTRODE PROBLEMS P. 108

Trouble is bound to start when you weld with damp electrodes. Lime or titania coatings on stainless arc welding electrodes readily absorb moisture. Porosity usually shows up, followed by cracking. To prevent such problems, here are some tips, starting with a simple short circuit test.

HAS AMERICAN MOTORS PASSED ITS CRISIS? P. 76

After two years of reorganizing, American Motors Corp. predicts its chances to show a profit in 1957 are good. But some stockholders see it differently. George Romney, AMC president, defends the firm's diversification program and salary policy.

FEATURE ARTICLES

STAMPING: WHAT KIND OF DIES TO USE P. 99

Choosing between separate, compound or progressive dies is never easy. But on this decision rests the profits for the individual stamping job. This article tells how to simplify the task. Die types are compared for labor costs, tooling costs, production rate and accuracy. Each offers advantages. Match your die choosing methods against these alternatives.

CAST TITANIUM GETS READY FOR BUSINESS P. 102

It will pay to keep abreast of happenings in the fast-breaking titanium industry. The latest: cast titanium parts are approaching the commercial stage. This report reveals that titanium parts are being successfully cast right now. But the method is no cinch and a lot of questions still have to be answered.

ALUMINUM-COAT STEEL PARTS FOR ALL-WEATHER WEAR P. 106

There are half-a-dozen ways you can beat atmospheric corrosion in designing hardware for outdoor service. You can paint or galvanize steels, or go over to aluminum, copper or stainless. A new, inexpensive method has been developed that simplifies aluminum-coating of steel parts which must endure long years of weather abuse.

ONE SETUP CLEANS AND STRESS RELIEVES CASTINGS P. 112

A large automatic transmission plant tied its stress-relieving furnace together with a Kolene salt bath. The move eliminated burned-in sand or heat-treat scale that formerly raised hob with machining and service life. The new integrated setup readies four 65-lb castings for machining every 1½ minutes.

MARKETS AND PRICES

SCRAP SHORTAGE IN NATIONAL EMERGENCY? P. 66

The Commerce Dept. is worried about steel scrap supply in event of a national emergency. It concludes that under the present pattern of usage, a "serious shortage" of scrap could result in time of war.

LOOK FOR MORE ANTI-TRUST ACTION P. 81

Justice Dept. antitrust lawyers are compiling a lengthy list of companies that will be inspected for possible antitrust law violations. High on the list are the copper and nickel industries. There is growing concern in Washington over the declining fortunes of smaller firms.

HAWAIIAN BAUXITE DEPOSITS INTEREST ALUMINUM FIRMS P. 83

While low-grade, their alumina tonnage could run into the hundreds of thousands of tons. It might relieve U. S. of dependence on foreign sources of supply. Kaiser and Reynolds are among those exploring the situation.

STEEL MARKET CATCHING ITS SECOND WIND P. 157

Fears of a letdown in steel demand have been discounted. So users are settling down to a normal pattern of buying. Even automotive shows signs of nearing the cut-off point in its inventory reduction program.

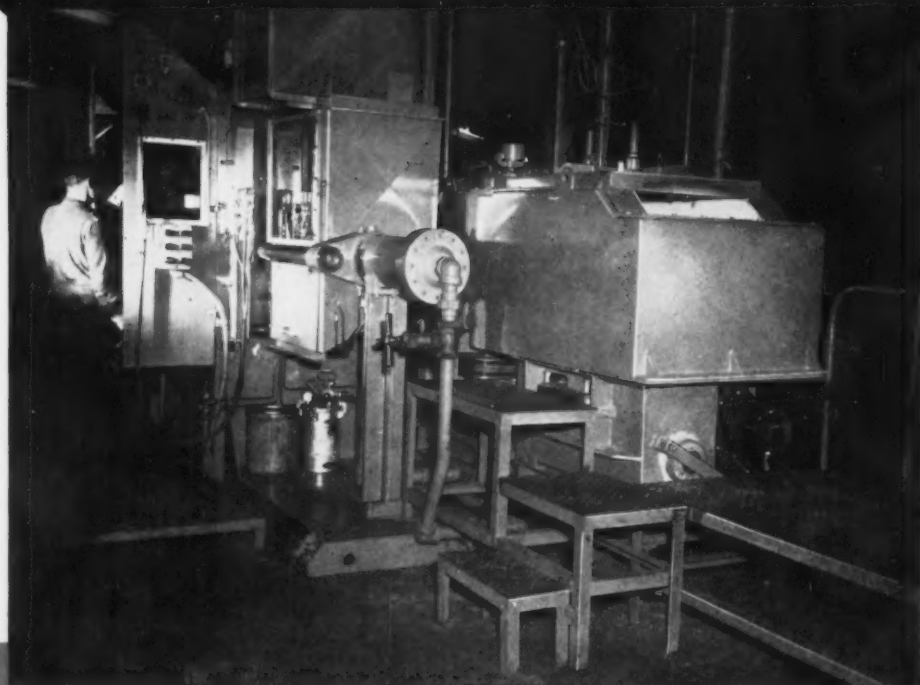
NEXT WEEK:

AIR CONVEYORS BREEZE THROUGH HANDLING CHORES

An air conveyor is much more than just a tube and blower these days. Usually, it is a fully integrated handling setup capable of keeping pace with complex production processes. Next week's special report explains what air conveyors can do.



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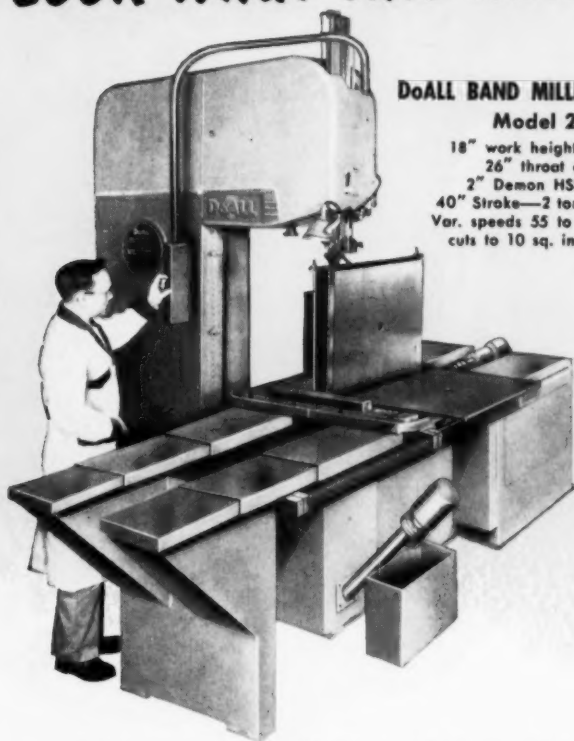
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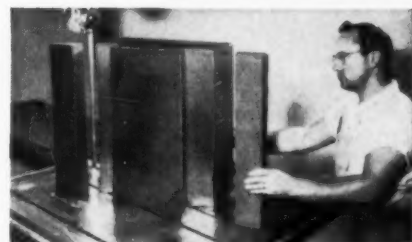


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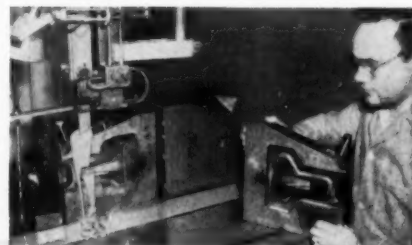
LOOK AT THE ACCURACY

A straightedge shows the accuracy on the cut illustrated at right—parallel and true within .002".



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Indexed in the Industrial Arts Index
and the Engineering Index.



February 7, 1957

EDITORIAL

How Not To Cause A Panic

♦ THE CALM COOL voice came over the loudspeaker of the four-engined plane. We were not too high over Manhattan, having left La Guardia a short while before. There was an air of "something up" as the co-pilot talked to the stewardess.

"Lean back in your seat, folks, and relax. It looks as if we will have to return to La Guardia. The wheel gear in the nose will not retract. Chances are 99 out of 100 that someone failed to take out the pin before we took off."

It was the way he said it that counted. The stewardess went right on giving crash instructions. The young sailor in the seat ahead was briefed on how to work the escape chute. It turned out later that this was his first flight.

Material was removed from above the seats. We were told quietly to take sharp instruments from our pockets. Eye-glasses were put away. Each passenger got his pillow—and his instructions on what to do with it as the plane landed.

Again came the friendly, confident voice. "Folks, are you taking it easy? We are coming in to land now. As I told you, I am sure we will have no trouble. We will find out that someone forgot to take out the pin. We will be on the ground a short time until we find out what the trouble is. Then we will be on our way."

We landed without a bump. Crash cars, fire engines and "big wheel" cars were surrounding us as the tractor pulled the plane in towards a gate. Everyone breathed a sigh of relief but there was no panic, no sickness. Only one man left the plane, not to return.

We were told promptly that someone had failed to take the pin out of the nose landing gear. The pilot thought that was the trouble, but he did not know for certain.

He had a plane-load of people depending upon him. His job was to keep panic out of the air and unnecessary worry and fear from the passengers. He did a marvelous job. American Airlines should be proud of him.

You, too, have a similar responsibility when talking about the country's economic health. And the same power to prevent panic. Use it!

Tom Campbell

EDITOR-IN-CHIEF

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dear editor:

letters from readers

Fast Start

Sir:

I want you to know that I think that your editorial "You Must Still Beat the Bushes!" in the Jan. 10 issue is an excellent message. We have urged key people in our organization to read it thoroughly and to consider what you have said as it applies to our situation.

Congratulations on a most stimulating, inspiring and challenging editorial. It is just the sort of thing that will help to get a good many people off to a fast start for the new year. *F. J. Smith, Vice Pres., Columbus Bolt & Forging Co., Columbus, O.*

Happy Fella

Sir:

I have had a wonderful time going through your January 3 Annual Issue, which is a combination of a great deal of valuable factual material on the industry, plus the usual annual crystal ball gazing. *J. R. Miller, Exec. Vice Pres., Ramseyer & Miller, Inc., New York.*

Fringe Benefits

Sir:

Was very much interested in your report on "Fringe Benefits" on p. 23 of your Jan. 10th issue.

I think some of your readers may be a little bit confused as to the comparisons you're making between reports of the Office Executives Assoc. of New York and the National Office Management Assoc. As you undoubtedly know, the Office Executives Assoc. of New York is the New York chapter of the National Office Management Assoc. and as such is one of 114 chapters who participated in the NOMA study. The figures released by the New York group, of course, only apply to New York City and represent the NYC portion of the NOMA

study. *A. F. Denham, A. F. Denham & Co., Detroit, Mich.*

Although we reported that the survey was made by the Office Executives Association of New York perhaps we should have indicated that it was made in New York City.—Ed.

Modern Management

Sir:

Please send me a copy of the Dec. 20 article, "Arbitrators: Blessed or Damned?" This is No. 6 in your Modern Management Series.

If copies of earlier articles in the series (Is Business Cycle Old Hat?, March 1, '56; How to Grow Management Talent, May 3, '56; Labor: Small Business Is Forgotten Man, July 5, '56; Diversification: Watch The Pitfalls, Aug. 6, '56 and Ten Commandments of Industrial Health, Nov. 8, '56) are still available, I would appreciate your sending me these also.

THE IRON AGE is one of the finest magazines I have ever read. *F. X. DeCloux, Harnischfeger Corp., Milwaukee, Wis.*

For No. 7 in the series see p. 59. Reprints of earlier articles are still available.—Ed.



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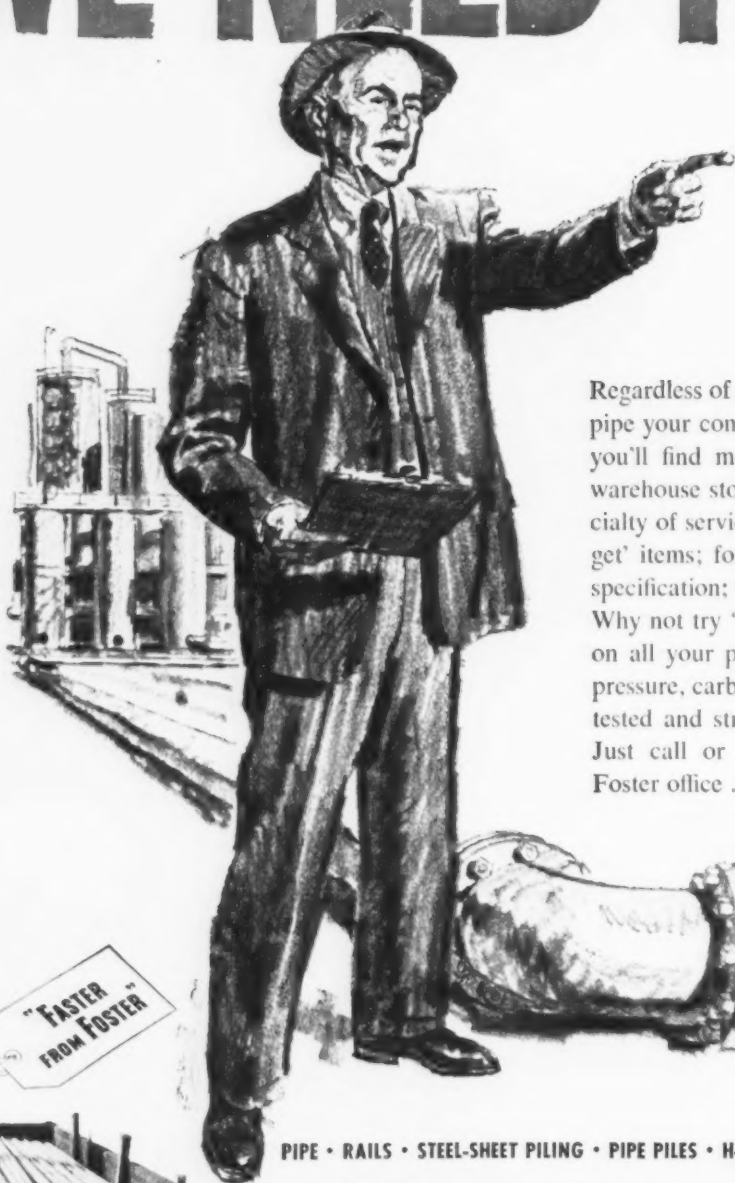
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Rare Bird

Our cover story this week marks No. 7 in our Modern Management Series—and the first one for this year. Judging from your response to earlier articles we think you'll agree the editors pick some top-notch authors for the series.

There are reasons for this. Number one, the editors try to choose timely topics of high interest to management. Next, they look for an expert well-respected for his knowledge of the subject. The third requirement is perhaps the most important of them all. The author must be willing to say something worthwhile and helpful to metalworking executives. There's no room for apologists or axe grinders.

This week's cover author, Eugene B. Mapel, is no exception. He is vice president of Barrington Associates, one of the country's leading management consulting firms.

Not only that but Gene is one of these rare birds who is equally at home as a consultant searching for facts; as a dynamic speaker on modern marketing techniques; or as a lucid writer on the changing concepts of management.

We think you'll get a kick out of his views on management consultants on p. 59.

Radicals and Parity

Our man has just returned from a tour through the National Bureau of Standards with a group of business magazine editors. He reports that there are free radicals trapped there and that the theory of parity is questioned by its scientists.

Explanation of free radicals and parity seems in order before Congressional investigation is launched. Former involves capture and storage of highly reactive molecular fragments at temperatures near absolute zero.

"Conservation of parity" experiment is the now-famous affair which shattered a fundamental concept of nuclear physics. The concept, held for 30 years, actually hindered certain development work. Bureau tests supported the theory of Lee and Yang at Columbia.

You might have expected (if you believed in parity) that radiation would be the same both up and down. It wasn't. Hence the end of the mirror image theory. The field? About 25,000 oersteds.

New Puzzler

Put yourself in the position of the prisoner who was given 10 white balls, 10 black ones and 2 boxes. He was told that the executioner would draw one ball from one of the two boxes. If it was white the prisoner would go free. If it was black —.

How would you arrange the balls in the boxes to give yourself the best odds for survival?



"It's a box of fuses. I'm going to ask the board for another \$50,000 appropriation for expansion!"

NEW PLANT FLEXIBILITY



- moves *Inland Steel Products* into special production 4-times faster
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dates to remember

FEBRUARY

Drop Forging Assn.—Winter meeting and exhibit, Feb. 11-13, Edgewater Beach Hotel, Chicago. Assn. headquarters, 419 S. Walnut St., Lansing, Mich.

American Management Assn. — Mid-winter personnel conference, Feb. 13-15, Palmer House, Chicago. Assn. headquarters, 1515 Broadway, New York.

The Institute of Surplus Dealers—Sixth annual trade show and convention, Feb. 16-19, New York. Society headquarters, 673 Broadway, New York.

EXPOSITIONS

1957 Nuclear Congress—March 11-15, Philadelphia.

American Society for Metals—March 25-29, Los Angeles.

American Foundrymen's Society—May 6-10, Cincinnati.

American Institute of Mining and Metallurgical Engineers—Annual meeting, Feb. 24-28, Roosevelt and Jung Hotels, New Orleans, La. Society headquarters, 29 W. 39th St., New York.

MARCH

Society of Automotive Engineers Inc. —National passenger car, body and materials meeting, March 5-7, Sheraton-Cadillac Hotel, Detroit. Society headquarters, 485 Lexington Ave., New York.

American Machine Tool Distributors' Assn.—Spring meeting, March 6-7, El Mirador Hotel, Palm Springs, Calif. Assn. headquarters, 1900 Arch St., Philadelphia.

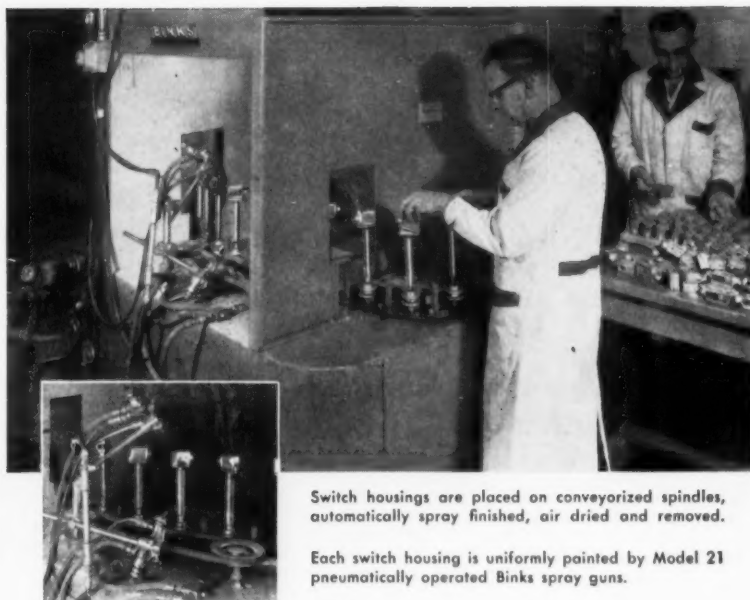
Pressed Metal Institute — Technical meeting, March 6-8, Hotel Carter, Cleveland. Society headquarters, 3673 Lee Rd., Cleveland.

National Assn. of Waste Material Dealers, Inc.—Annual convention, March 10-13, Hotel Conrad Hilton, Chicago. Assn. headquarters, 271 Madison Ave., New York.

Steel Founders' Society of America—Annual meeting, March 18-19, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

APRIL

The American Society of Mechanical Engineers—Spring meeting, April 8-10, Dinkler-Tutwiler, Birmingham, Ala. Society headquarters, 29 W. 39th St., New York.



Switch housings are placed on conveyorized spindles, automatically spray finished, air dried and removed.

Each switch housing is uniformly painted by Model 21 pneumatically operated Binks spray guns.

A Binks automatic spraying machine at MICRO SWITCH...

**"paid for itself in three months
...boosted finishing output 400%"**

"We are now able to paint up to 945 switch housings an hour," reports Mr. Walter Gage, finishing foreman for the MICRO SWITCH division of Minneapolis Honeywell Regulator Company, Freeport, Ill. "This is four times our previous hand spraying rate and we use one-third the manpower."

Fast, uniform finishing

Switch housings are placed on conveyorized spindles which rotate as they pass through the spray booth. Binks pneumatically operated Model 21 automatic spray guns apply a uniform coating on all surfaces as each spindle passes.

Engineering help available

Working with your engineers and production people, Binks spray finishing engineers can help you cut costs...boost production...improve quality. Because Binks line of spray finishing equipment is so complete, they need not compromise in the selection of any part of a finishing system. The "right" equipment combination for your every production need, is always available.

For complete information

Contact your nearest Binks Branch Office or write direct to the address below.

**Ask about our spray painting school
Open to all...NO TUITION...covers all phases.**



SPRAY GUNS



AIR COMPRESSORS



SPRAY BOOTHS

Binks Manufacturing Company
3124-30 Carroll Ave., West, Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY



**GRANITE CITY STEEL
COMPANY...**



"Keeps Rollin' Along"

**And Allis-Chalmers steel mill equipment
is helping in a new expansion
program designed to increase steel
production in mid-America**

ALONG the banks of the mighty Mississippi, near the geographical center of mid-America, new steel-making facilities are being planned. Granite City Steel Company is planning another major expansion program which will raise their ingot production 30% by early 1958.

Just two years ago, Granite City Steel completed an \$89,000,000 expansion. It was the culmination of a 7-year

program, in which Allis-Chalmers supplied all major electrical requirements, bringing this midwestern plant up to maximum efficiency.

In this new modernization, Allis-Chalmers steel mill equipment will again play an important role. So far, Granite City has called on Allis-Chalmers for all the necessary electrical equipment needed to revamp their cold-strip mill, and the single-stand temper mill, plus other auxiliary machines.

Allis-Chalmers specializes in mill modernization and expansion. For specific information on drives, control and other electrical equipment for steel mills, contact your A-C representative, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Other Allis-Chalmers Products for the Steel Industry

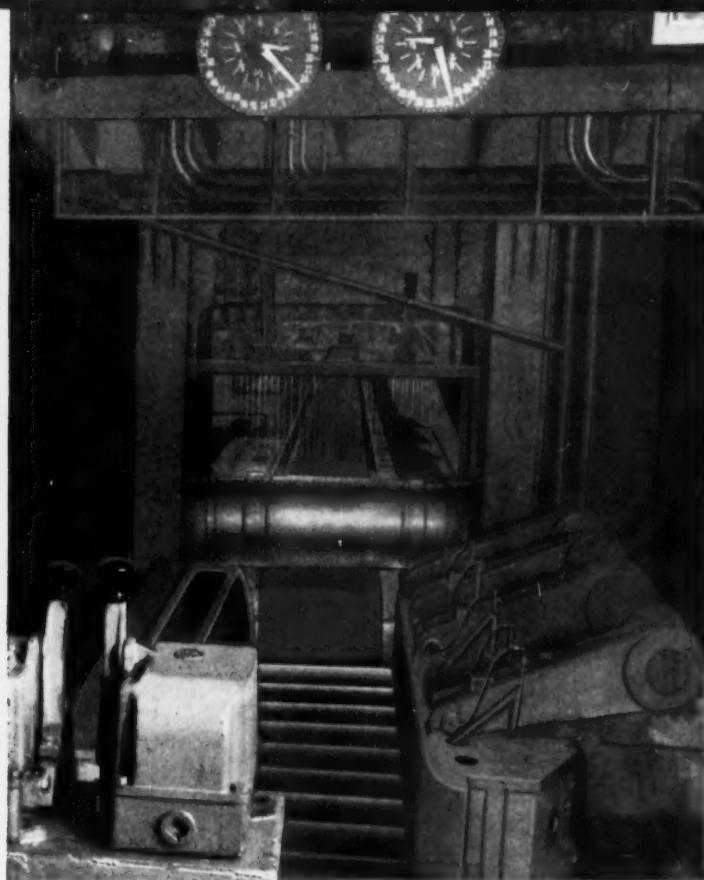
Centrifugal Blowers • Axial Blowers • Arc-Furnace Transformers • Mercury-Arc Rectifiers • Rotary Compressors
Unit Substations • Switchgear • Circuit Breakers • Voltage Regulators • Power Generation Equipment



ALLIS-CHALMERS

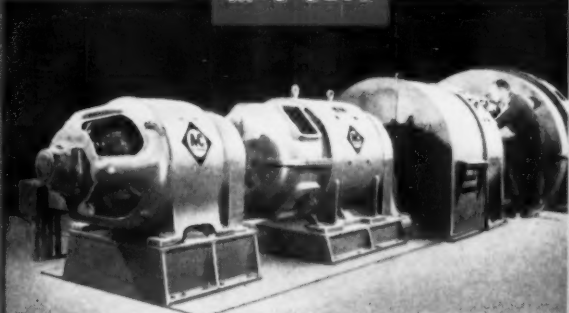
A-5178

Regulex is an Allis-Chalmers trademark.



M-g sets supporting cold-strip mill motors. These units are rated at 7750 kw, 514 rpm. Furnished by Allis-Chalmers in 1946, they will be supplemented by new units.

M-G SETS

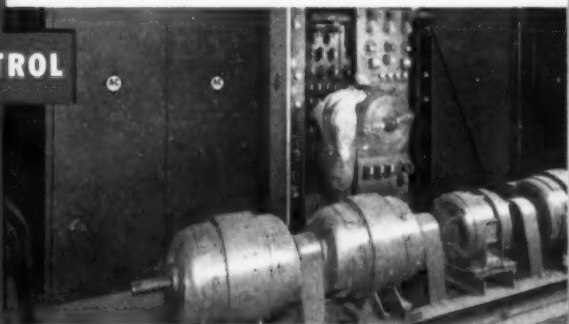


On the 56-inch temper mill, this 4-machine m-g set supporting the skin pass mill motors will be revamped. Two new 225-kw dc drag generator units will be furnished by Allis-Chalmers for this mill.

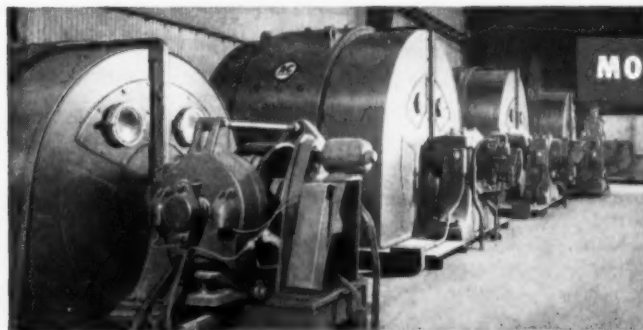


CONTROL

This variable voltage control board is used on the 56-inch tandem cold reduction mill. New control equipment is being furnished by Allis-Chalmers for new mill expansion at this midwestern steel plant.

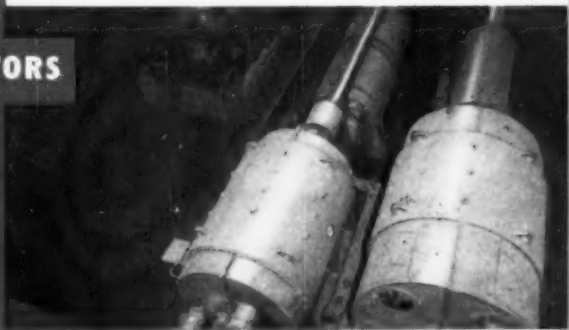


Regulex control and totally enclosed control board were furnished by Allis-Chalmers in 1948 for the 48-inch temper mill at Granite City Steel Co. Additional control is being furnished for the 56-inch temper mill.



MOTORS

Motor room view at this plant shows Allis-Chalmers units driving delivery reel and main stands. Allis-Chalmers motors furnish drive power throughout the plant. New motors, ranging in size from 25 to 5000 hp, are being installed.



Allis-Chalmers motors shown driving the temper mill include main roll drive, delivery tension, and delivery reel drive. Allis-Chalmers furnished original motors for both temper mills, as well as new motors for increasing capacity.

"We're getting **TOP** *performance*

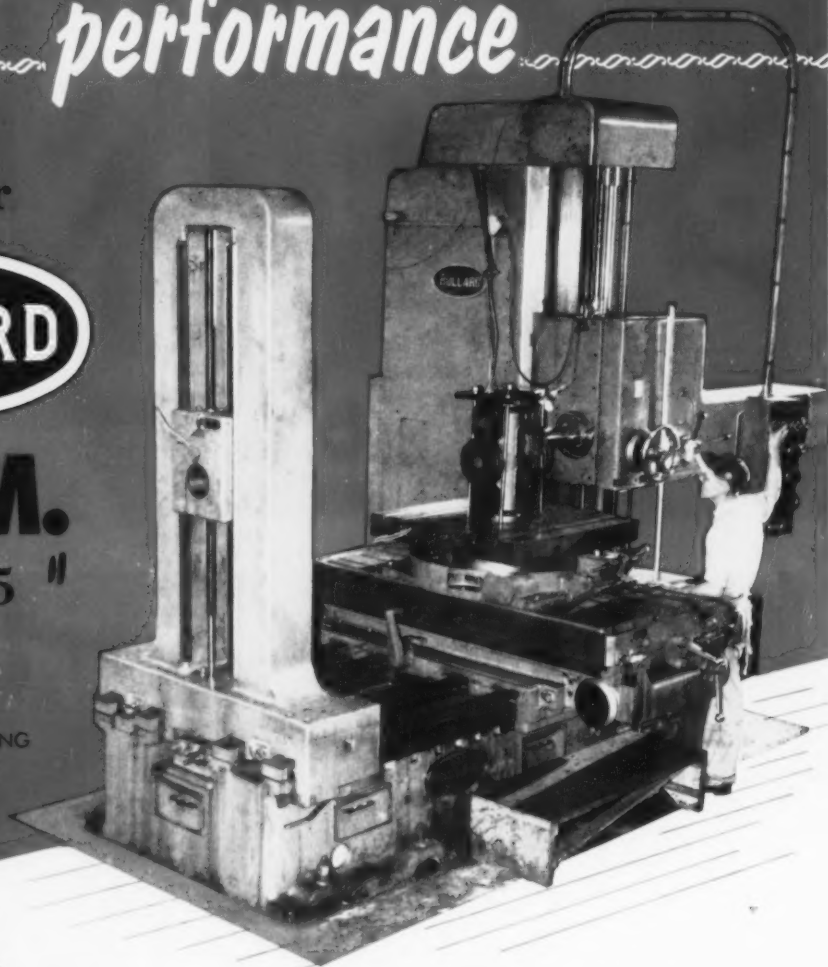
from our

BULLARD

H.B.M.

Model 75 "

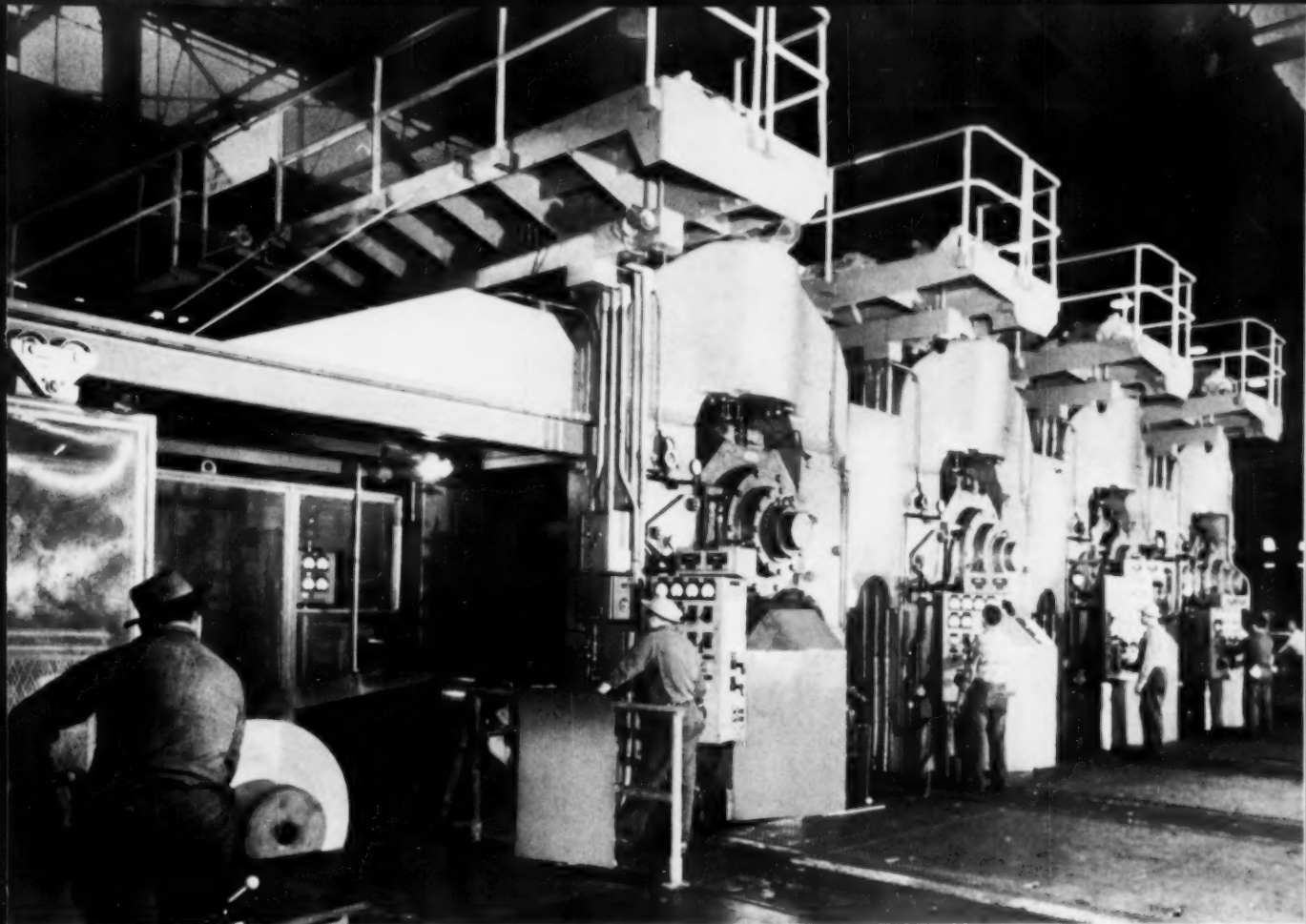
GAS CYLINDER CASTING
FOR COMPRESSOR



"The acquisition of our Bullard HBM, Model 75 has eliminated a production bottleneck by giving us a reliable machine to handle our output" says Mr. Frank A. Kocavar, Chief Industrial Engineer at The Joy Manufacturing Co., of Michigan City, Indiana, manufacturers of portable and stationary compressors for industry.

This "built-in reliability" of the Bullard HBM, Model 75 can be applied to your boring, milling, drilling and facing problems — check its outstanding features by calling your nearest Bullard Sales Office or Distributor or for a complete catalog, write to —

**THE BULLARD COMPANY
BRIDGEPORT 9, CONNECTICUT**



This 66" four-stand tandem cold strip mill at Pittsburgh Steel operates at speeds up to 3190 fpm maximum, has 17,700-hp total drive motor capacity.

Higher speed . . . more on-gauge strip

with Westinghouse Magamp[®] regulators
on coordinated mill drive systems

In March, 1954, the first tandem cold reduction strip mill controlled entirely by Westinghouse Magamp magnetic amplifier regulators was installed at the Pittsburgh Steel Company, Allenport, Pennsylvania. This control's performance since then has resulted in higher permissible operating speeds and more on-gauge strip. Practically no adjustment or maintenance has been required on the mill stand and reel regulating equipment.

Two other four-stand tandem mills with individual generator power supply and all Magamp control are operating successfully, and equipment for four additional mills is being manufactured or installed.

[®]Trade-Mark

See how Westinghouse coordinated drive systems
are Magamp controlled for greater productivity

YOU CAN BE SURE...IF IT'S Westinghouse



Precise Magamp power control yields . . .

More on-gauge strip at 6000 fpm and beyond

More on-gauge strip during acceleration, deceleration and rated speed rolling are yours with Westinghouse Magamp regulators . . . even with the trend toward greater power application. Results are fewer waste ends, increased productivity.

A Magamp regulator system delivers optimum over-all mill performance because it properly regulates and improves the response characteristics of mill and reel motors and power supply generators.

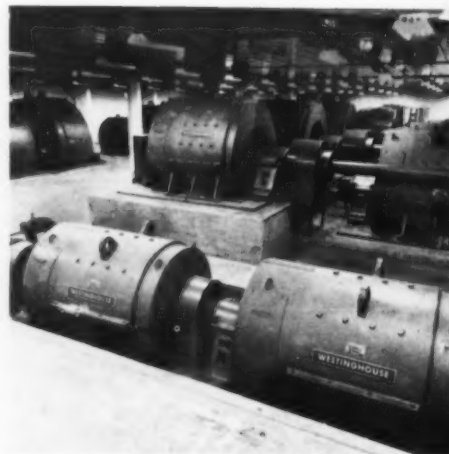
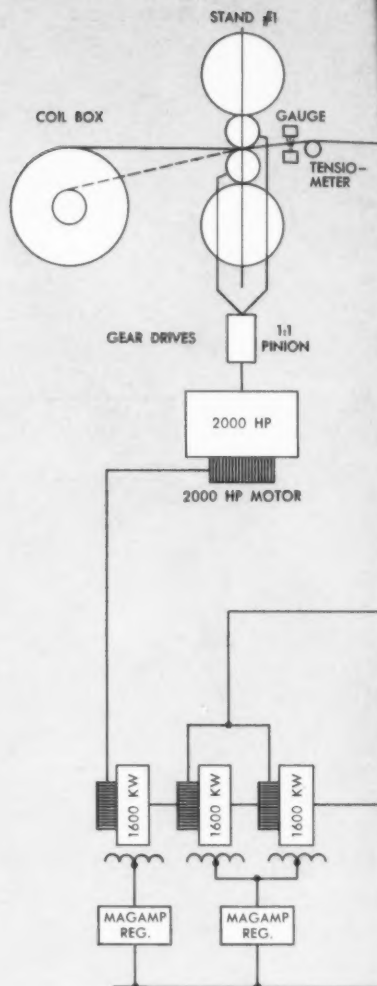
Magamp's high amplification and extremely short response time assure accurate generator voltage control. Operation from 400 cycles gives fast response and inherent stability without complex or critically adjusted damping circuits. Here's how the system works:

DRIVE ARRANGEMENT—Working rolls in mill stands one and two are driven together through pinion stands. Upper and lower rolls in stands three, four and five are driven separately through offsetting speed-up gears, the 6000-hp #5 drive consisting of two 3000-hp, double-armature motors. Winding reel motor is 1500-hp, triple armature. Each stand and reel drive is supplied from separate generators, on two motor-generator sets with duplicate 12,000-hp synchronous driving motors.

MAGAMP REGULATOR CONTROL—Generator(s) for each stand and reel power supply is controlled by a Magamp voltage regulator, operating on 400-cycle, three-phase supply from an alternator set.

AUTOMATIC GAUGE CONTROL—Strip thickness gauge at stand one controls stand one screwdown to minimize variations in starting hot strip and to feed uniform strip to rest of mill. Gauge at stand five controls stand five motor speed, and tension between stands four and five to maintain constant gauge of finished strip.

TENSIONMETERS—Units between stands indicate total tension and difference in tension between two edges of the strip.



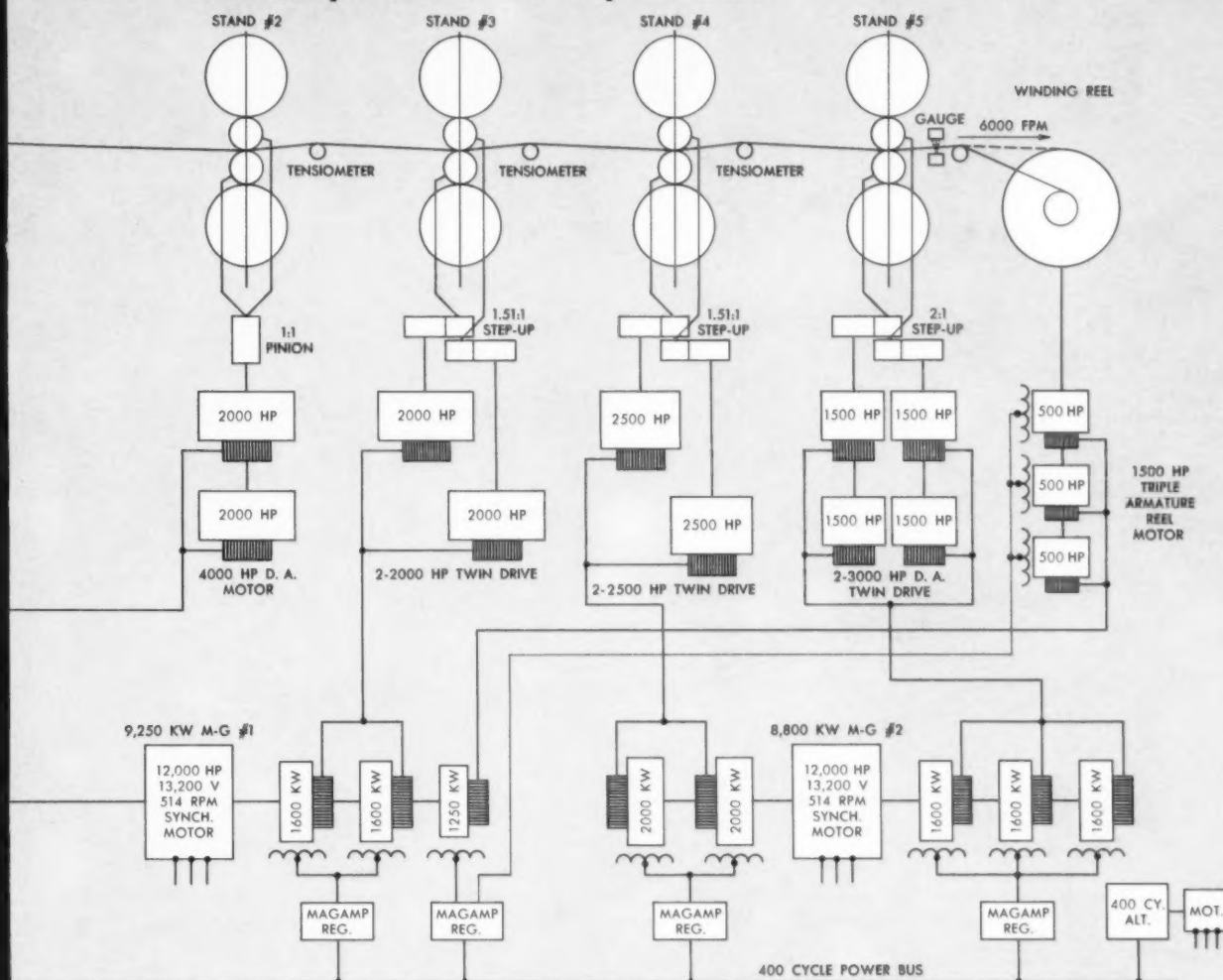
Motor room for 66" tandem cold strip mill.

YOU CAN BE SURE...IF IT'S

Westinghouse



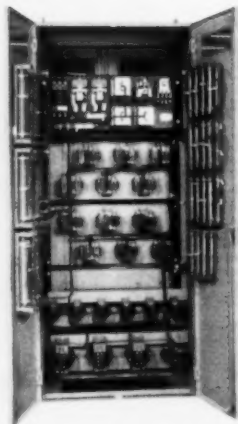
6000 fpm tandem tin plate mill



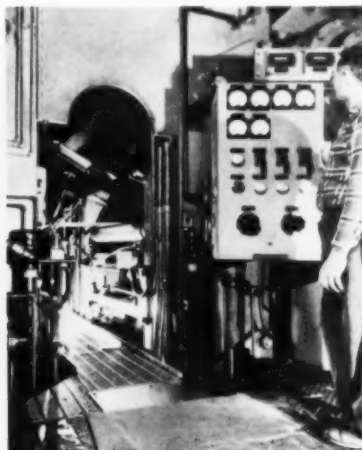
A 48"-wide five-stand mill like this is now under construction for the Wheeling Steel Corporation. It will have 22,500-hp total drive capacity to produce tin plate and heavier strip at speeds up to 6050 fpm.

Progressive users of Magamp regulator control on tandem cold strip mills

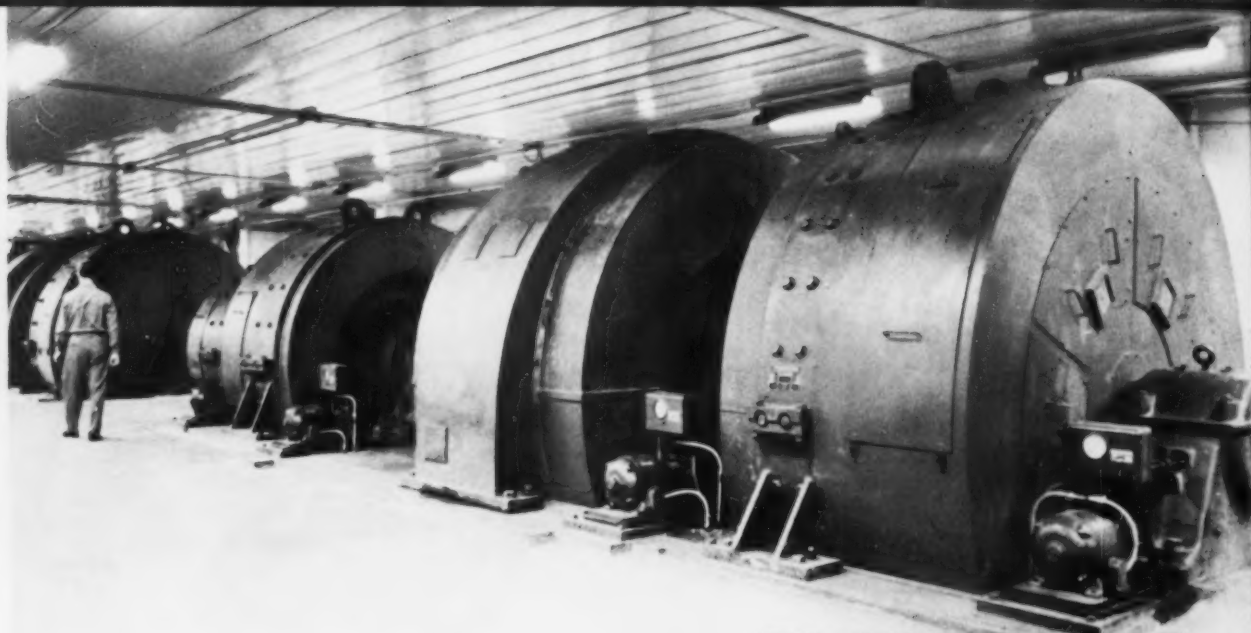
PLANT	YEAR	STANDS AND WIDTH	DELIVERY FPM	TOTAL HP
Pittsburgh Steel Co. Allenport, Pa.	1954	4-66"	1595/3190	17,700
Alan-Wood Steel Co. Conshohocken, Pa.	1954	4-32"	1100/2293	6150
Empire Steel Corp. Mansfield, Ohio	1955	4-52"	747/1868	8100
Usinor Montataire, France	1956	4-66"	1375/3630	19,450
Nonferrous—Ohio	1956	4-32"	850/2075	4400
Steel Mill—Ohio	1957	3-80"	747/1670	13,000
Wheeling Steel Corp. Yorkville, Ohio	1957	5-48"	2750/6050	22,500



Magamp regulator cabinet.



Tensiometer between mill stands.



Westinghouse Exclusive!

Thermalastic[®] insulation excels in punishing steel mill duty

Twenty percent greater dielectric strength, ten times greater voltage endurance, 30 times greater tensile strength . . . that's Thermalastic, an amazing insulation available exclusively from Westinghouse.

Thermalastic shrugs off moisture, high voltage and dirt . . . helps Westinghouse motors and motor-generator sets better withstand severe steel mill operating conditions.

A chemically stable, highly moisture-resistant impregnating resin is used in Thermalastic. This, plus a high degree of fill achieved in the impregnating process, gives Thermalastic extraordinary properties that extend its life in hard service.

Remember, too, Westinghouse switchgear, control centers, ventilation equipment, and gearing are excellent working partners for your Westinghouse coordinated mill drive systems.

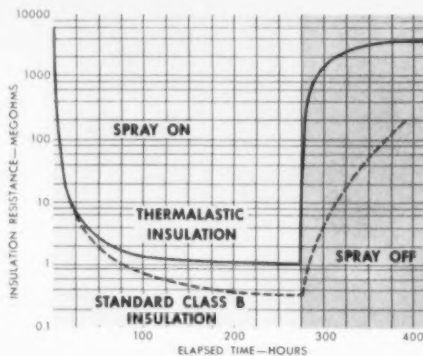
From planning to design, installation and start-up . . . Westinghouse is at your service. An experienced Westinghouse team will accept unit responsibility, and work with your engineering staff and consulting engineers in setting up your tandem mill drive.

Contact your Westinghouse sales office for further details. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

MP-3046



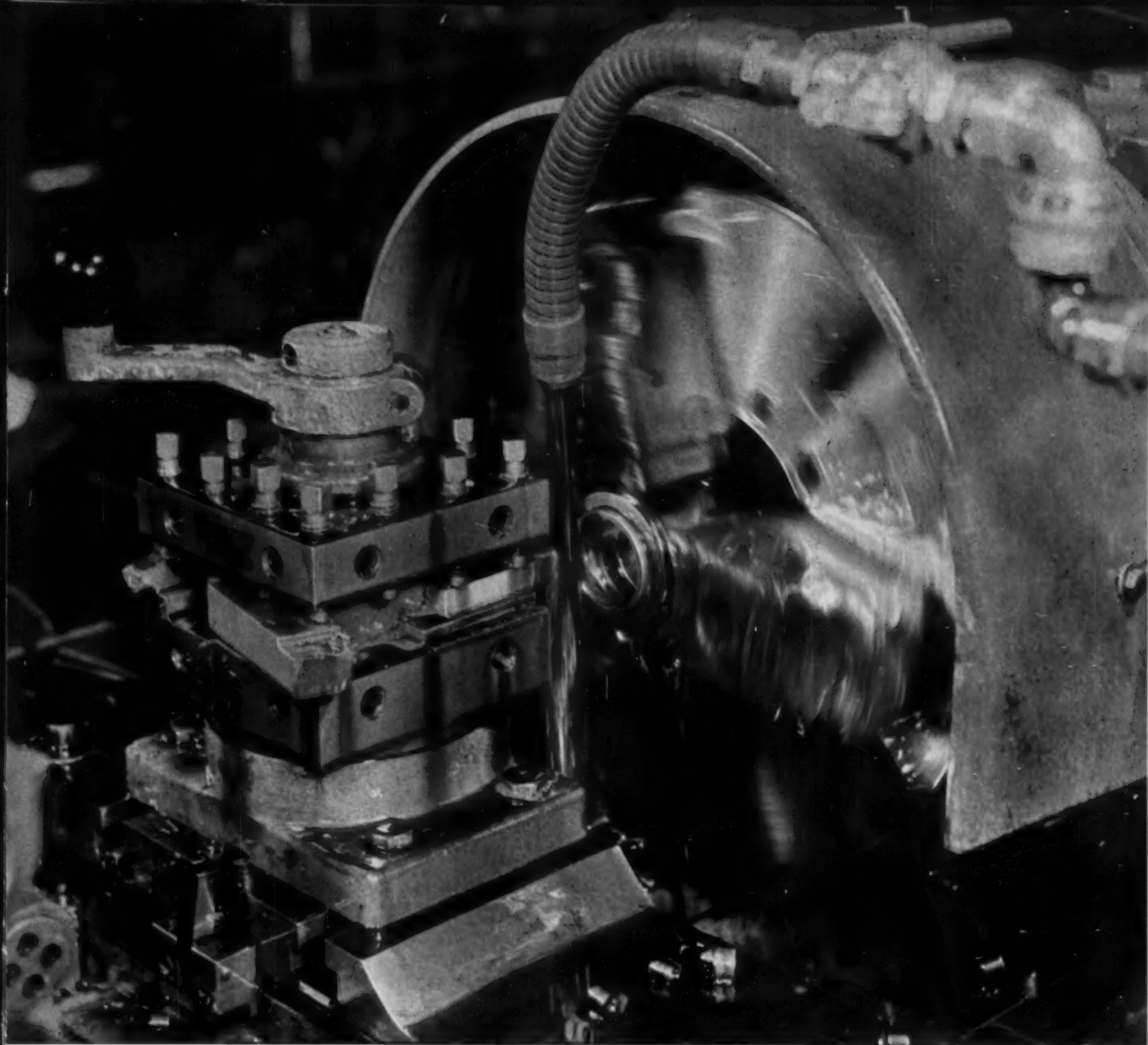
Thermalastic-insulated Westinghouse motor-generator sets (top photo) for 66" four-stand tandem cold strip mill.



Results of typical laboratory spray test demonstrate superior moisture resistance of Thermalastic compared to regular insulation.

YOU CAN BE SURE...IF IT'S Westinghouse





NOW...

**a complete line of cutting oils
under one great name...**

GULFCUT



GULFCUT

cutting oils increase tool life ... lower machining costs!

- 9 different oils—a modern cutting fluid for every specific job
- Each Gulfcut oil scientifically compounded to meet exact needs

As an aid to simplification, all the famous Gulf cutting oils are now available as one complete line, under one name: GULFCUT. By ordering "Gulfcut" you can select from 9 different shop-tested cutting oils—and there's a proper type for every metal cutting need. The Gulfcut line includes mineral-lard oil, sulfurized-mineral oils, sulfurized-mineral-lard oils, sulfo-chlorinated-lard oils, and emulsifying oils. Your Gulf Sales Engineer will gladly show how Gulfcut cutting oils can mean longer tool life and reduced machining costs in your shop!

GULFCUT 11A AND 11D

Non-staining, non-corrosive mineral-lard oils, generally recommended for machining non-ferrous metals.

GULFCUT 21A, 21B AND 21C

Sulfurized-mineral oils made by a special Gulf process to provide greater sulfur activity over a wide range of machining operations. Transparent and relatively light in color.

GULFCUT 31A AND 31C

Sulfurized-mineral-lard oils that excel in performance over a wide range of machining operations on many types of steel. Have outstanding anti-weld properties and load carrying ability. Sulfur is combined in three different forms for maximum chemical activity.

GULFCUT 41A, 41B AND 41C

Sulfo-chlorinated-lard oils for high production jobs on automatic machines. Engineered with the proper combination of sulfur, chlorine and fatty oil. They also provide proper lubrication for machine tools.

GULFCUT 41TG

Sulfo-chlorinated-lard oil specifically compounded for thread grinding operations.

GULFCUT 43A

Sulfo-chlorinated oil for high production machines requiring an oil of this type for pipe cutting and threading, screw and bolt making machines, and cutting operations on steels with free and moderate machinability characteristics. Contains a corrosion inhibitor to protect ferrous metals and machine parts.

GULFCUT 43B

Specially blended sulfo-chlorinated-lard oil for high production machines requiring an oil of its viscosity and compounding. Dual purpose—suitable for machine lubrication as well as for cutting operations.

GULFCUT 45A AND 45B

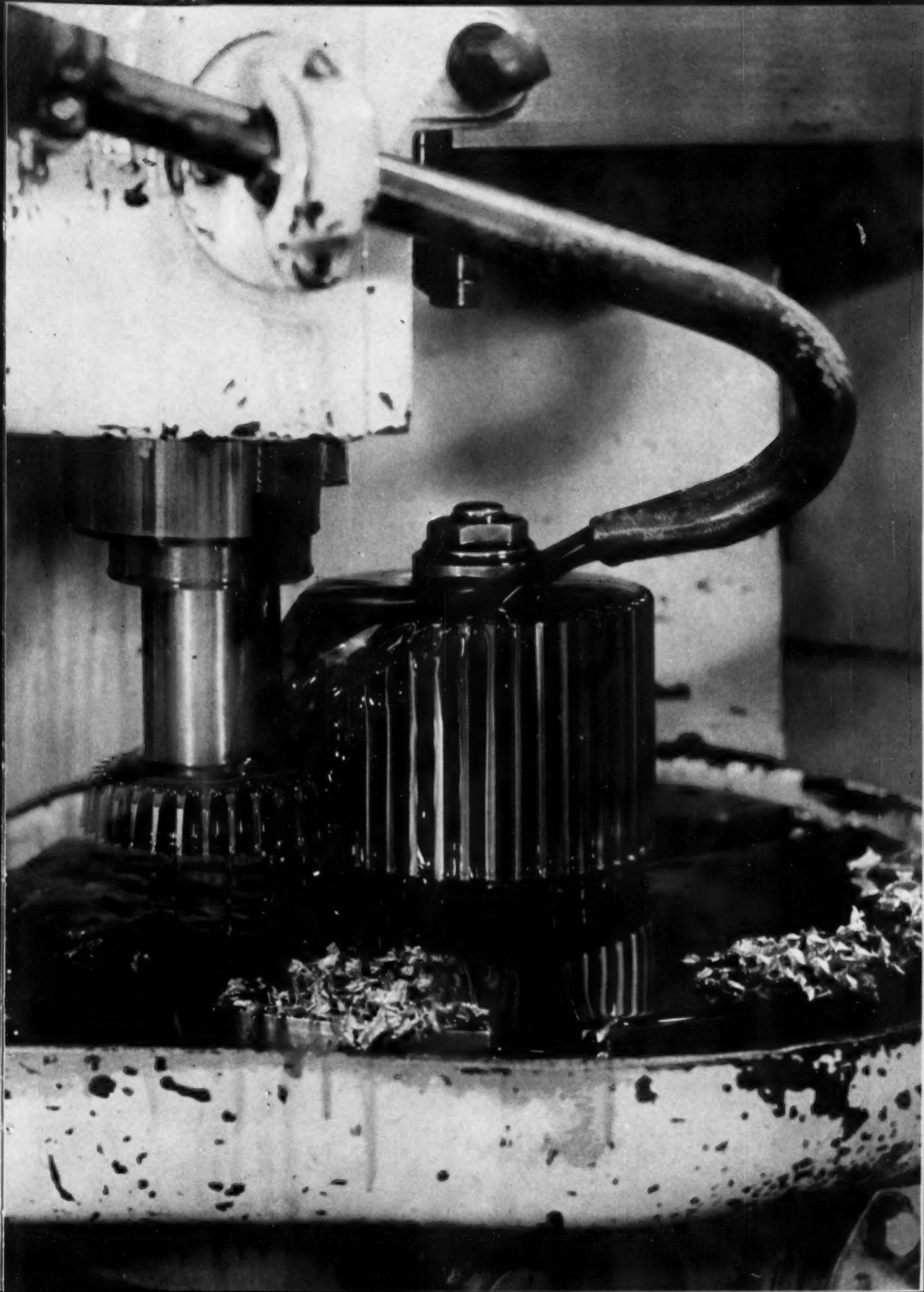
High quality sulfo-chlorinated-lard oils with excellent load carrying and anti-weld characteristics to insure best results on the most difficult jobs. Have heavy concentrations of sulfur, chlorine and fatty oil. May be diluted for less difficult jobs.

GULFCUT 51A

Emulsifying oil with a wide range of uses in cutting, forming and rolling operations where a coolant with moderate lubricating properties is required. Readily mixes with warm or cold water as high as 100 to 1. Forms homogeneous and exceptionally stable emulsions.

Cutting a gear from SAE 4815 steel on Fellows Gear Shaper. Gulfcut 21-C, with relatively light color and transparency, permits close inspection of work in progress.



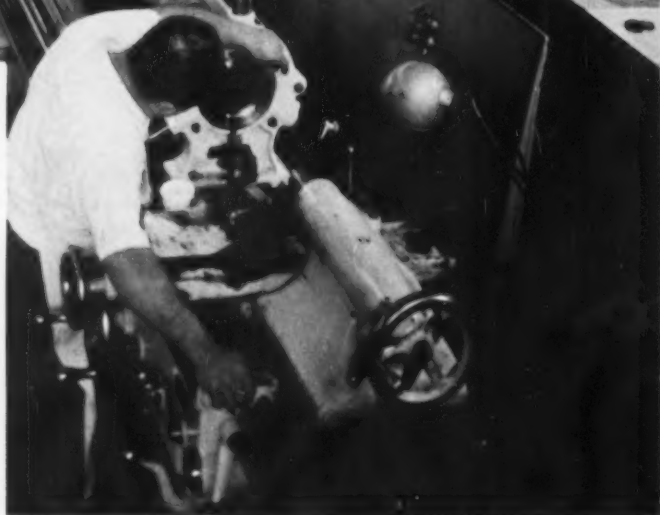




Machine shop at Gulf's Harmarville laboratories is a proving ground for Gulfcut cutting oils.

GULF PETRO-ENGINEERING SERVICE

For practical technical aid, at no cost to you, call in your Gulf man. He can help you save money if you use cutting oils, lubricants, fuels, rust preventives, quenching oils, solvents, waxes or process oils. Whether you have an immediate problem—such as oil vapors, sludge or corrosion in your storage tanks, or some vital machine "running hot"—or whether you're just interested in simplifying your fuel and lubricant storage and dispensing methods . . . your Gulf Sales Engineer has a practical answer. Call him today.



MAIL THIS COUPON TODAY FOR MORE FACTS ON GULFCUT

GULF OIL CORPORATION
1822 Gulf Building, Pittsburgh 30, Pa.

Gentlemen:

- ☐ Please send me your free bulletin on Gulfcut Cutting Oils.
☐ Please have a Gulf Sales Engineer call on me.

Name

Company

Title

Street

City Zone State



GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.

LIGHT ISN'T WASTED UP HERE



MORE LIGHT IS REFLECTED TO THE
WORK AREA DOWN HERE

Stop paying for wasted light

SWITCH TO GENERAL ELECTRIC
REFLECTOR LAMPS, GET
MORE LIGHT—SAVE MONEY, TOO!

TO GET MORE LIGHT ON THE JOB . . . OVERNIGHT just switch to General Electric Reflector Lamps in your filament or mercury lamp systems. It's as easy as a twist of the wrist. The reflectors are sealed *inside* the bulbs where they can never get dirty. You get up to 78% more light on the work . . . where you want it. There's a size to fit your present system; no need to buy new fixtures or sockets.

YOU SAVE MAINTENANCE DOLLARS, TOO. You seldom if ever have to clean fixtures. Maintenance is reduced to changing burnouts—and the uniform life of General Electric Lamps makes it possible to change burnouts on a regular schedule.

CHOOSE FROM THESE FILAMENT REFLECTOR LAMPS. General Electric's 500- and 750-watt filament reflector lamps are available in standard or high voltage, and 1000-watt in standard voltage. Their sealed-in, pure silver reflectors never need cleaning.

CHOOSE FROM THESE MERCURY REFLECTOR LAMPS.

(1) The General Electric RW-1 with white phosphor reflector is the newest, and gives you the most light at lowest cost in most areas. Also you get better, whiter light, than from any clear lamp. (2) The RC-1 with phosphor reflector gives you extra light (only 7% less than the RW-1) and color improvement, too. (3) The R-1 has a pure silver reflector; is best for extremely dirty areas.



RW-1



RC-15

And if you're now using 1000-watt Mercury Lamps, try the new half-phosphored G-E 1000-watt Mercury Reflector Lamps (either RC-15 or RC-12). All lamps are interchangeable with comparable clear lamps.

Your General Electric Lamp specialist will be glad to help you pick the best G-E Reflector Lamp for your plant. Contact him now—or write: General Electric Co., Large Lamp Dept., Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL  ELECTRIC



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Name

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Progress Is Our Most Important Product

GENERAL  ELECTRIC



Typical parts machined by Leviton Manufacturing Company from Alcoa Aluminum Screw Machine Stock

WHEN LEVITON MAKES A SWITCH, THEY USE ALCOA ALUMINUM SCREW MACHINE STOCK

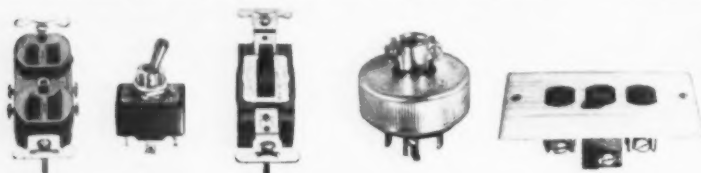
Leviton Manufacturing Company first substituted aluminum for scarcer materials. Today, new parts are designed first for aluminum, and the other materials are viewed as substitutes.

For over thirty years, Leviton has specialized in the manufacture of fine electrical wiring devices for residential, commercial and industrial use. Today the company is the largest in its field and operates a huge main plant in Brooklyn, New York. Other plants are at Hills Grove, Rhode Island; Montreal, Canada; Chicago and Los Angeles, with sales offices in all major cities of the United States and Canada.

Whether you make parts for the electrical industry,

like Leviton, or market your products elsewhere, you'll find you can't beat Alcoa® Aluminum Screw Machine Stock for quality and economy. Cutting speeds as high as 1,000 feet per minute are not uncommon. Aluminum resists corrosion, offers excellent heat and electrical conductivity. Its light weight gives you up to three times as many parts per pound.

Alcoa wants to help you profit from aluminum screw machine stock's many advantages. Just call your nearby Alcoa sales office, listed under "Aluminum" in your phone book. Aluminum Company of America, 870-B Alcoa Building, Pittsburgh 19, Pennsylvania.





IN MANAGEMENT

Bernard Leviton, Executive Vice President and spokesman for the Standards Committee says, "Alcoa has been one of our suppliers since 1941. Since then, we have had a steady progression of changes to aluminum. Ours is a high-volume, high-production business. In any case where we've had a problem—whether materials, packaging or machining—Alcoa has the right man on the spot in 24 hours. And that man has the right answers. Alcoa's technical services are, in effect, an actual part of our developmental facilities. The jobs we've worked out together meet the high standards of Underwriters' Laboratories and Canadian Standards Association. At every level, Alcoa has made sure we are satisfactorily served."



IN ENGINEERING

George Smith, Chief Engineer, says, "We think Alcoa's engineering data and technical assistance set the standard and give us firm foundations of fact on which we can make decisions. I recall one specific case of many . . . Alcoa lubrication engineers gave us information that enabled us to increase tool life dramatically. Typical of the aluminum screw machine parts we make are components for toggle switches, including bat handles, bushings and mounting nuts. Close tolerances are a must. A variation of as little as .001 inch in some switch parts means the device just won't work. Yet, with aluminum, the parts fit together nicely, work smoothly."

IN PRODUCTION

Edward Palczewski, Foreman of the Screw Machine Department (shown with operator), says, "We've been cutting aluminum during the ten years I've been with Leviton. We have one job running on a high-speed Davenport which does 120 pieces a minute. It consists of forming, drilling, tapping and threading $1\frac{1}{2}$ -inch rod. We're running the machine at top capacity. Swaging diminishes the machinability of some metals—takes away their free-cutting qualities. Aluminum's properties are retained no matter what we do with it—doesn't get stringy or lose machinability. During setup, tools can be set dry. The operator can see what he's doing—saves a lot of time. Cutting oils are lighter, cheaper. Stock is easier to handle."



IN PURCHASING

Joseph Wolfson, Purchasing Agent, says, "Our Purchasing Department at Leviton demands dependability from suppliers. It is this simple fact that has characterized our relationship with Alcoa for over 15 years. Use of Alcoa Aluminum Screw Machine Stock has helped us to reduce our inventory and order problems; for example, one Alcoa alloy offers advantages of free cutting and free swaging. Once, when we increased production on a certain job and ran into low-stock problems, Alcoa's early delivery service really helped us out."



THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

**Your Guide to the Best
in Aluminum Value**



POURING PROBLEM?



REPUBLIC



World's Widest Range of Standard Steels

You can have expert, obligation-free advice from A REPUBLIC PIG IRON METALLURGIST

He's right up-to-the-minute on all the latest foundry techniques. He knows all types of irons and their characteristics. Knows what they will do or will not do under certain conditions. His thorough knowledge is based upon a combination of years of actual foundry experience and metallurgical training.

The Republic Pig Iron Metallurgist also has the advantage of being backed by the only producer of a complete line of merchant pig irons—Republic Steel. This is an advantage that he can pass along to you by being in a position to recommend the proper grade of pig iron for a specific job without hesitation or prejudice.

He's a regular and welcome visitor in hundreds of foundries. They rely on him for expert advice on pouring problems, molding practice, improving castings, increasing output, reducing costs.

Have a problem in your foundry? Then ask for the man who knows his irons—call in a Republic Pig Iron Metallurgist. His service is confidential and without obligation. Mail the coupon if you would like him to call at your foundry.

STEEL

and Steel Products



HANDLING PROBLEM? Standard and special units from Republic's complete line of materials handling equipment are solving problems at every stage of production. One company used the PB-120T Box and Skid Units shown above to reduce handling costs 25%, minimize inventory time, provide better visible product identification, free valuable floor space for production equipment. Republic Materials Handling Specialists will help you design units to meet your specific needs. Send coupon for Catalog No. 620.



STORING PROBLEM? Republic Wedge-Lock Steel Shelving solves the problem of storing dies, tools, patterns, etc. This exceptionally strong shelving is designed specifically for high stacking of enormous weights. Joints actually get tighter and stronger as weight increases. There's no sagging, swaying or buckling. Wedge-Lock assembles quickly and easily and is completely flexible to meet changing requirements. It's the answer to maximum loading in minimum floor space. Send coupon for Catalog ES-931.

LIFTING PROBLEM? Republic Chain Slings provide a safe method of lifting heavy and hard-to-manage materials. This new catalog contains complete information and specifications on Republic Chain Slings, Attachments and Accessories. Tells you how to use slings properly to obtain maximum life . . . how to store . . . how to inspect . . . how to order. Send coupon for your copy.



REPUBLIC STEEL CORPORATION

Dept. C-3212

3104 East 45th St., Cleveland 27, Ohio

☐ Have a Pig Iron Metallurgist call.

Send the following Catalogs:

☐ Wedge-Lock Shelving ES-931 ☐ Chain Slings No. 719

☐ Materials Handling Equipment No. 620

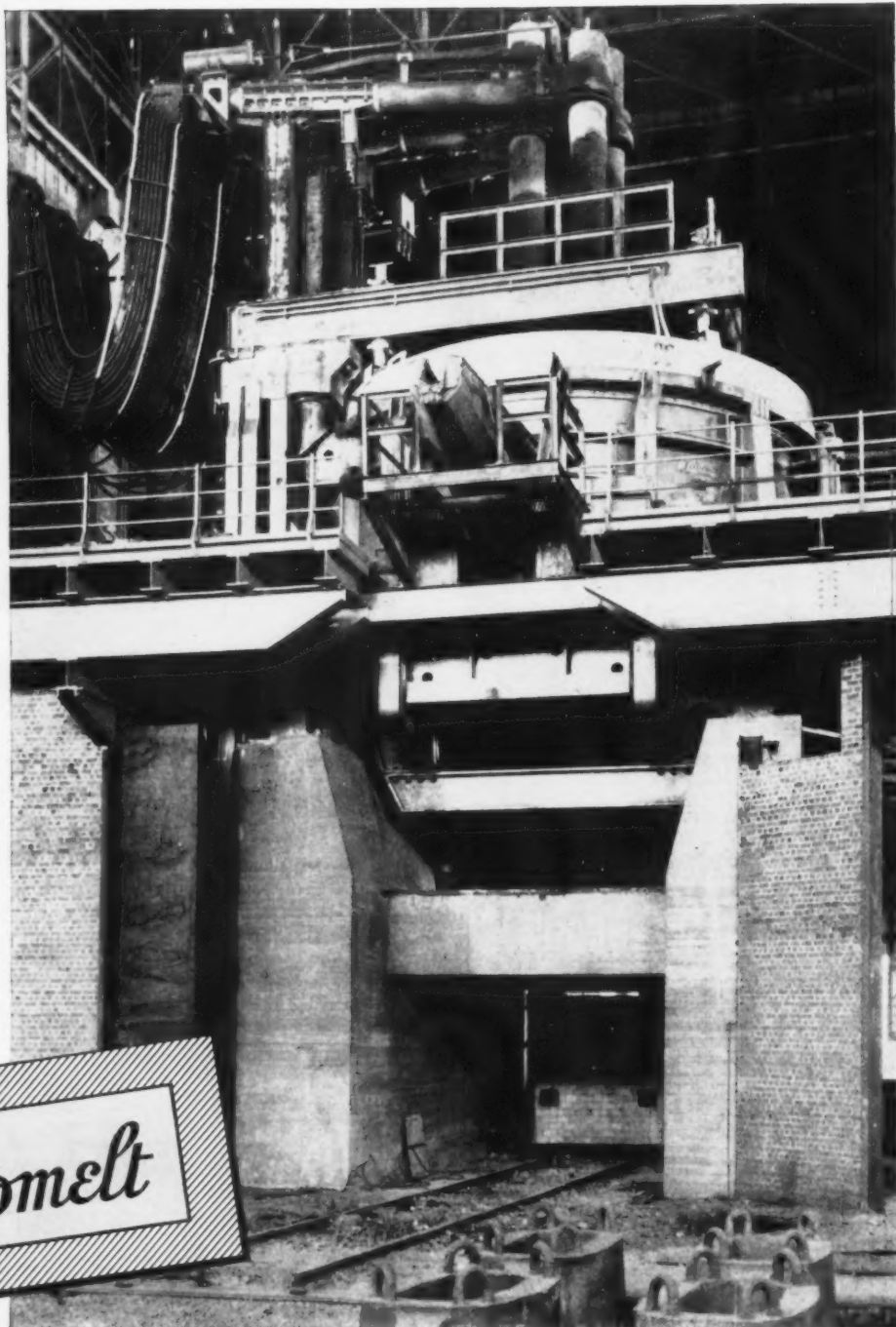
Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Built into **The World's Most**



Lectromelt

Here, your steel castings and forgings are followed from raw material to finished product under "One Responsibility and One Control".

ERIE FORGE & STEEL
CORPORATION

Powerful Melting Furnace

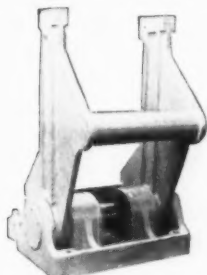
To Lectromelt Specifications

STEEL CASTINGS — FORGINGS

BY-*Erie Forge & Steel Corporation*



Cast Steel Roof Lift Cylinder
and Cylinder Head
Weight—Cylinder 13,300 pounds
Head—3140 pounds



Cast Steel Tilting Cylinder Sole Plate
and Bumper Block Side Castings
Weight—3040 pounds



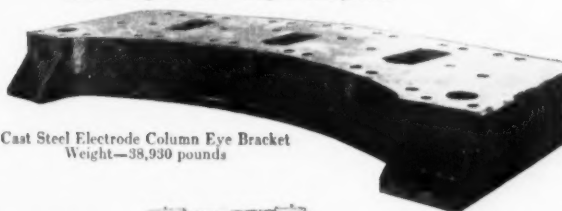
Cast Steel Roof Swing Cylinders
Weight—2750 pounds



Cast Steel Roof Lifting
Ram Socket Bracket
Weight—25,660 pounds



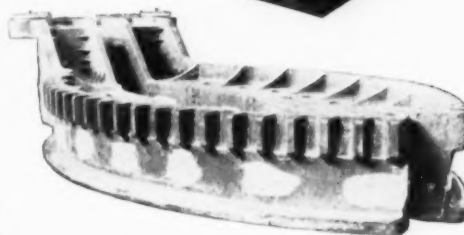
Cast Steel Hydraulic Tilting Cylinder Assembly
Steel Castings each end—Weight—2475 pounds



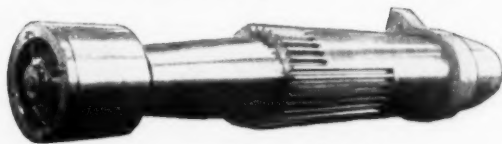
Cast Steel Electrode Column Eye Bracket
Weight—38,930 pounds



Cast Steel Pedestal Track
Weight—19,500 pounds



Cast Steel Furnace Bottom Rockers—2 Halves
Weight—30,500 pounds each



Forged Steel Roof Lifting Ram
Weight—53,700 pounds

Cast Steel Roof Lifting Piston Head
Gland Ring and Cap Assembly
Weight—2990 pounds

Cast Steel Roof Ram Buttress
Weight—3880 pounds



Member American Iron & Steel Institute

Erie, Pennsylvania



Photo courtesy 20TH Century Mfg. & Supply Co., Tulsa, Oklahoma

"We are extremely proud of the job our PORTAGE mills are doing"

The Portage Machine Co.
Akron, Ohio

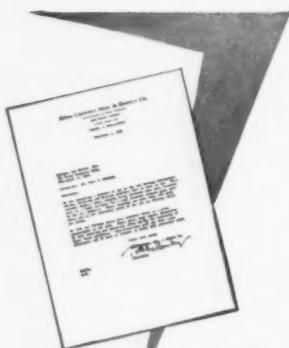
Gentlemen:

Our business, as you know, is Contractors of Metal Products. This particular job is a steel forging being machined, and when finished will be a fluid cylinder for a high pressure pump used in the oil industry. These forgings are made from AISI-4140 steel and we are extremely proud of the job PORTAGE mills are doing.

We find our PORTAGE mills very accurate. These mills must repeat themselves in each location and operation often during the machining operation. Specifications call for very close tolerances and we have no trouble in doing this precision work.

Yours truly,
20TH Century Mfg. & Supply Co.

R. G. Galloway
R. G. Galloway
President



THE *Portage* MACHINE CO.

1035 Switzer Avenue • Akron 11, Ohio

Representatives in Principal Cities

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916



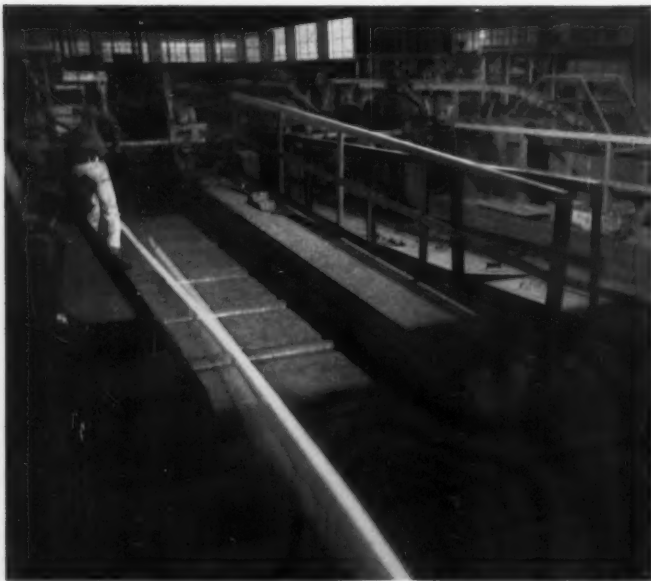
NEW STAINLESS BAR MILL

Gives Greater Product Range

to *Rotary* Customers



Rotary's New Bar Mill



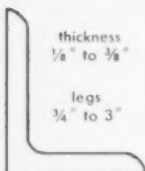
The two roughing stands have tilt tables on the delivery side with adjustable manipulators, and on the opposite side, drag chains to bring the bars into position.

Flexibility is the Keynote of Rotary's Stainless Bar Mill

Small lot production with excellent quality control, in a variety of products, can be accomplished with Rotary's new facilities.

Stainless bar and wire products are produced with specialized equipment. Rotary with its new mill can now supply a variety of products required by its stainless customers.

The new mill will roll the following sections:



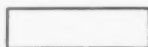
ANGLES

thickness
 $\frac{1}{8}$ " to $\frac{3}{8}$ "

legs
 $\frac{3}{4}$ " to 3"

$\frac{1}{4}$ " to $2\frac{1}{2}$ "

COILS



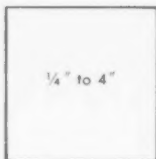
FLATS

$\frac{1}{8}$ " x $1\frac{1}{4}$ " minimum
to $1\frac{1}{2}$ " x 6" maximum
or equivalent cross
sectional area.



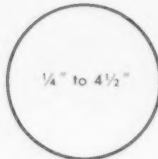
HEXAGONS

$\frac{1}{4}$ " to $3\frac{1}{8}$ "



SQUARES

$\frac{1}{4}$ " to 4"



ROUNDS

$\frac{1}{4}$ " to $4\frac{1}{2}$ "

Quality is maintained on this new bar mill by using batch-type furnaces for billet heating. These furnaces are of the double chamber type that permit control of the atmosphere and temperature cycles needed for the individual grades.



Batch-type furnaces with individual chamber controls permit use of the correct temperature and cycle for each grade.



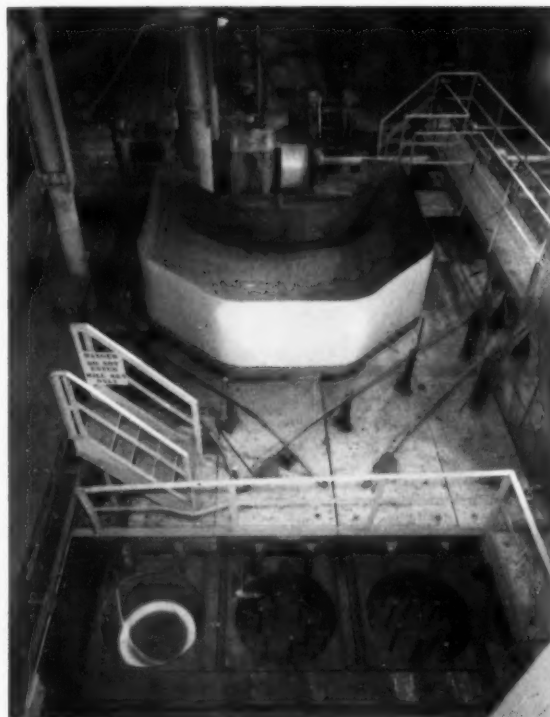
Action view of repeaters on 12" and 10" cross country stands. Speed control is from operator's pulpit.

Rotary's New Mill is Different

- Every step of the process at Rotary—from billet heating to cutoff, cooling or coiling is completely modern.
- Quick changeover of the mill can be made whenever necessary.
- Practically all manual lifting has been eliminated by installing the latest mechanical handling equipment.
- Stainless rod is rolled continuously on the mechanized 6-stand rod mill. Intermediate bar sizes are rolled on the 10" and 12" mills using mechanical repeaters, whereas sections and large rounds are rolled by hand.

Rotary now has two complete bar mills. One is a completely mechanized mill for the rolling of stainless and alloy. The other, a combination mechanical and hand mill for the rolling of stainless bars, rod and sections in a wide variety of grades.

The two mills permit scheduling of orders to meet customers' delivery requirements.



Coilers to handle stainless rod from 1/4" up to and including 2 5/32" diameter.

Rotary's Modern Storage Facilities Insure Prompt Delivery of Quality Stainless Bars



In Rotary's Stainless Building, above, hundreds of tons of stainless steel bars are finish-ground and placed in inventory to permit the prompt servicing of inquiries and shipment of orders. The photograph below shows Rotary's modern plant. It is on 41 acres of land on the northeast boundary of Detroit.



This 4-color brochure tells the complete story "How Steel is Made at Rotary." Send for your copy today.



Rotary Electric Steel Co.

Box 4606 • Detroit 34, Michigan

SALES OFFICES—Chicago, Ill. • Cleveland, Ohio • Newark, N.J.

SALES AGENTS—Indianapolis, Ind. • Fayetteville, N.Y.

Grinds 2,000,000 pieces per disc

Cool cutting deep corrugated Gardner disc gives
low unit grinding cost

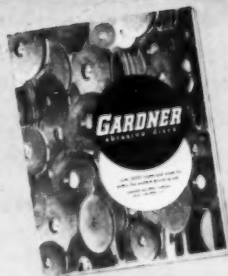


Stock Removal: .007"

Abrasive Disc Used:

Gardner YELLOW RIM® 18" x 1" x 5"

New Abrasive Disc Catalog, AC-55,
summarizes factors important in se-
lection of best disc for your particular
grinding job. Write for your copy.



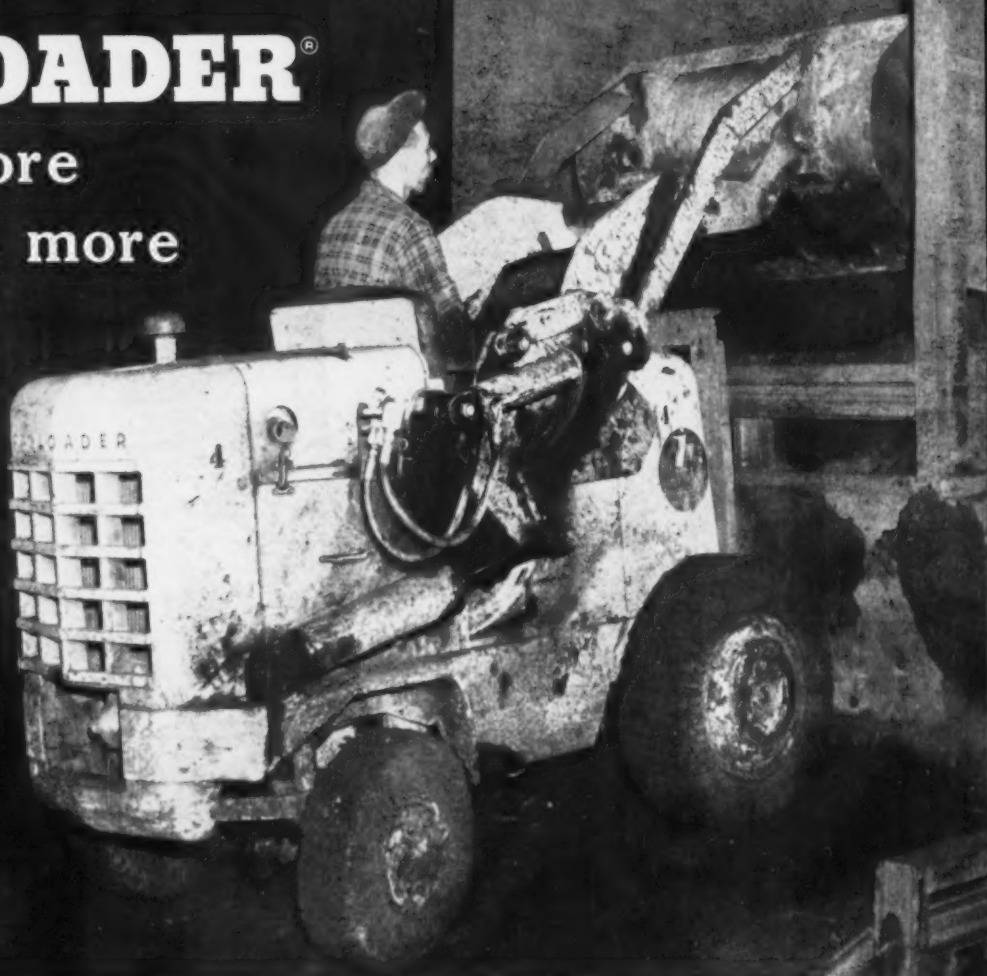
GARDNER

abrasive discs

BELOIT, WISCONSIN

PAYLOADER®

..does more
..endures more



What makes an HA PAYLOADER® best for your jobs?

Shortest turning radius
Highest dumping height
Biggest bucket (18 cu. ft. Payload)
Hydraulic load-shock-absorber
40° bucket tip-back at ground level
Exclusive, one-lever bucket control

THE FRANK G. HOUGH CO.

733 SUNNYSIDE AVE., LIBERTYVILLE, ILL.

Send data on "PAYLOADER" tractor-shovels

- ☐ HA (18 cu. ft.) and HAH (1 cu. yd.)
☐ Larger models to 2 1/4 cu. yd.

Name _____

Title _____

Company _____

Street _____

City _____

State _____

18

A tractor shovel *has* to be good to stand up to 5,000 hours of work a year in tough foundry service. One "PAYLOADER" model HA has done it for nearly 2 years and the second for nearly a year and they are both still going strong 16 hours a day, 6 days a week at Frazer and Jones Company, Syracuse. Milton Donahue, Night Foreman, praises them in these words, "The HA torque converter model is ideal for this job. It's short, insuring excellent maneuverability, has plenty of power to work fast. The self-loading roll-back bucket design enables the operator to load from floor level. I have put the HA against all foundry jobs with outstanding production. Downtime has been very low because it's designed and built for rugged work." These HA's take up sand from pouring floor, feed sand to hopper for reprocessing, windrow sand for cutter — also handle coal and help on furnace maintenance.

Owners *expect* more from a "PAYLOADER" and *get* more because more "PAYLOADER" tractor-shovels are in service than all other wheeled tractor-shovels put together and they are backed by 35 years of tractor-shovel pioneering. There's a "PAYLOADER" size and type to fit *your* needs and a nearby Distributor ready to serve you right.



PAYLOADER®

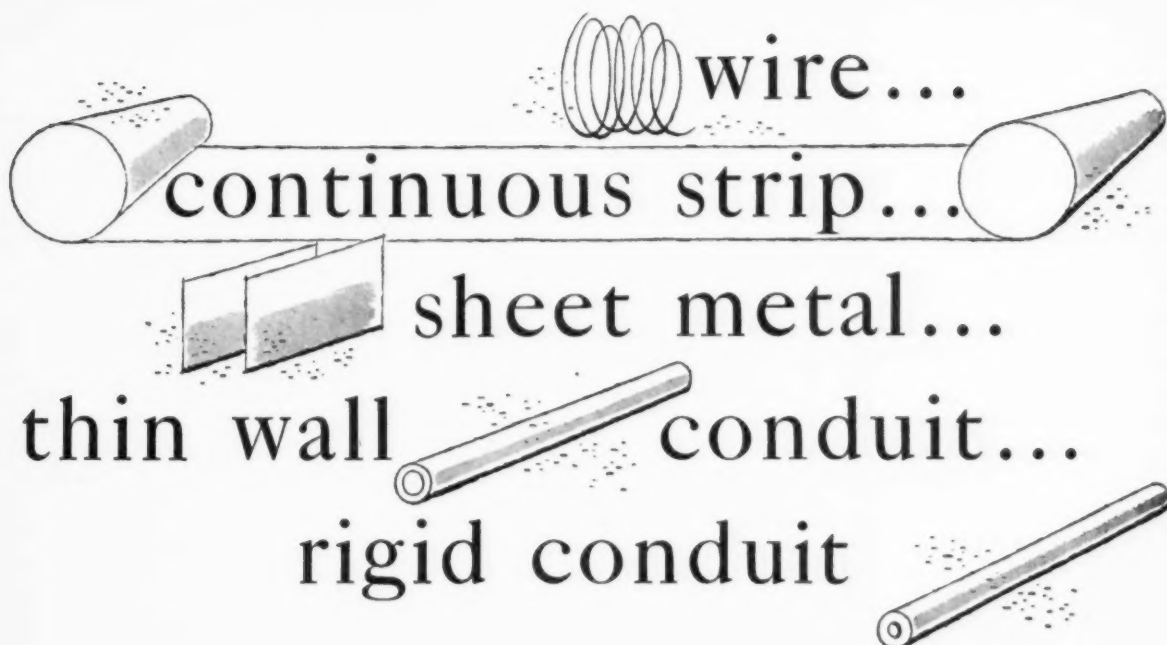
MANUFACTURED BY

THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



IF YOU PROCESS...



YOU CAN *Automate* ALL THESE OPERATIONS:

- cleaning
- pickling
- plating
- phosphating
- scrubbing
- paint prep
- electrogalvanizing

For Faster, Better Production . . . At Far Less Cost
with an
H-VW-M CONTINUOUS LINE SYSTEM

WRITE today, at no obligation, for the facts about an
H-VW-M System that can bring cost-saving *automation* to your
continuous line finishing—a system that can be integrated with
your shearing, forming, slitting or annealing operations.

**Hanson-Van Winkle-Munning Company, Matawan,
New Jersey Offices in principal cities.**



H-VW-M

PLATEMANSHIP—Your H-VW-M combination—
of the most modern testing and develop-
ment laboratory—of over 80 years experi-
ence in every phase of plating and
polishing—of a complete equipment,
process and supply line for every need.

Industry's Workshop for the Finest in Plating, Anodizing, and Polishing Processes • Equipment • Supplies

February 7, 1957

Another
Fostoria
Success
Story



Infrared drying lets you drive this Allis Chalmers truck *10 minutes after you Spray!*

Until Fostoria engineers were called in by the Allis-Chalmers Buda Division at Harvey, Illinois, their newly painted lift trucks and tractors took from 8 to 48 hours to dry by air. Production flow was unsteady. Units piled up in drying area.

Now, fully equipped trucks minus only the seats—with gas tanks full—move through an 18-foot Fostoria infrared oven for a thorough paint-drying that takes *only 10 minutes!* Type G-30 infrared lamps in their Fostoria-engineered oven have a total connected load of 100 KW.

Fostoria's fast, uniform infrared heating has improved production astonishingly, Allis-Chalmers officials say, while maintaining their top quality finish. The radiant oven gets more work done at lower cost.

One of Fostoria's experienced sales engineers in your area will be glad to give you latest facts on our radiant equipment widely used for heating, degreasing, drying, baking and other industrial processing. He can also arrange a convincing demonstration in your plant if you are interested. See your directory or write us for his name.



Write for free 20-page
book, "Radiant Heat—
Applications Unlimited"

**FOSTORIA PRESSED
STEEL CORPORATION**

Dept 224, Fostoria, Ohio

Pioneer manufacturer of radiant equipment—components and complete ovens

fostoria
INFRARED
SYSTEM

5516



How BRAINARD STRAPPING SERVICE cut pipe handling costs 20%

FIVE TONS of cumbersome pipe, held by four bands of $\frac{3}{4}$ " .035 Brainard strap, are safely moved by overhead crane to a gondola car at the Sharon Tube Co., Sharon, Pa. . . with a 20% saving in manhours and materials! Entire gondola car is then secured with $1\frac{1}{4}$ " .035 Brainard strap. Loading time has been cut 60% from previous manual operations.

A Brainard expert worked out this successful, cost-cutting operation. No matter what you make, package or ship, a nearby Brainard representative can show you the way to similar savings. Call him today, or write . . .

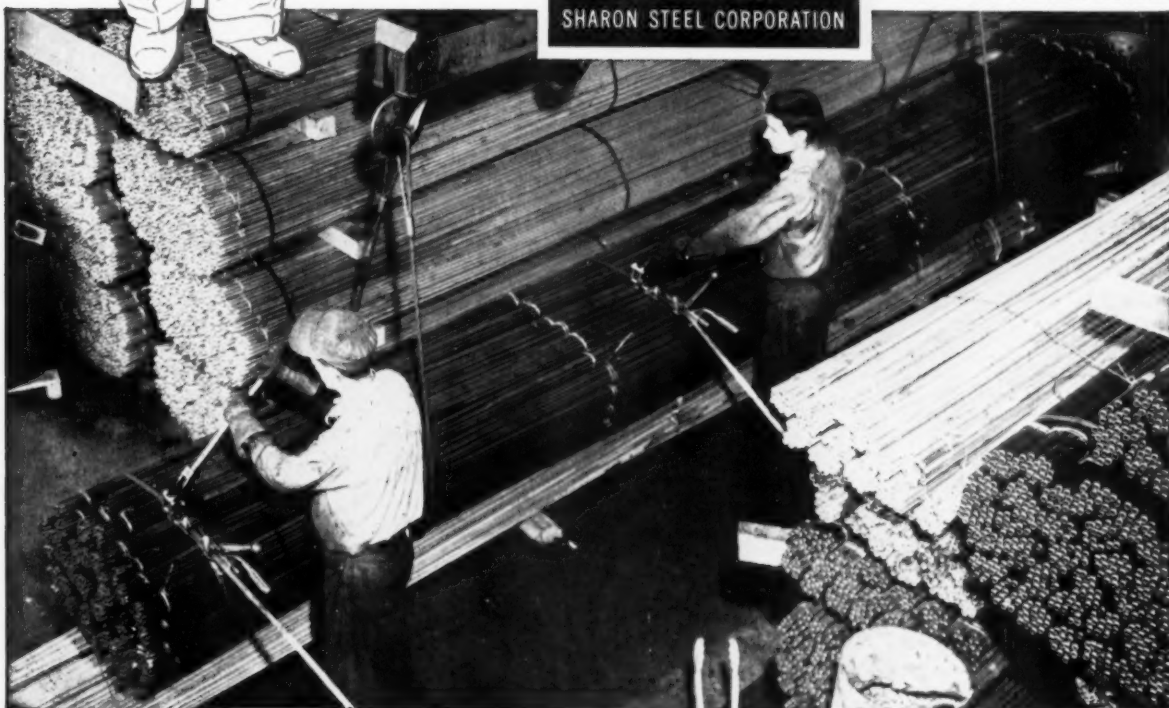
Brainard®

SHARONSTEEL

STEEL DIVISION
SHARON STEEL CORPORATION

**THE BRAINARD
STEEL DIVISION**
of the Sharon Steel Corporation
Dept. I-110, Griswold St.
Warren, Ohio

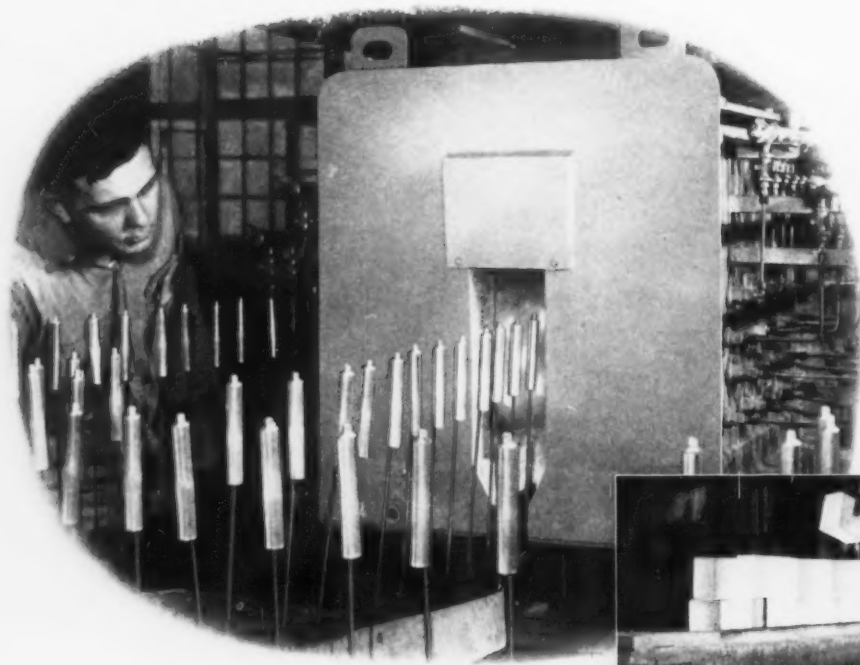
MAKERS OF QUALITY STEEL STRAPPING



Annealing Featherweight Aluminum Tubes

or

**HEATING
HEAVY
STEEL
SECTIONS**



Aluminum tubes work-harden after forming, must be annealed. Selas Gradation anneals on the production line at A. H. Wirz, Inc. Helps cut tube manufacture from 2 days to 45 minutes.



Alloy steel die blocks, 8" to 24" thick, are heated to 1550°F for hardening in Selas custom-built furnace at Heppenstall Company. Completely automatic program-control heating reduces previous 20-30 hr. cycle to less than 4 hr. Sonic testing assures that fast heating is practical and safe.

... automatic **Selas Gradiation[®]** speeds production

● Selas Gradiation Heating treats both thin aluminum tubes and thick steel die blocks with the same efficiency. Annealing in one case, heating for hardening in the other, the workpieces respond to the preciseness, the uniformity, the controllability of Gradiation heating with a speed never before accomplished by conventional methods.

Widely separated operations, yet Selas in-line equipment keeps pace with modern production requirements.

To meet the increasing demand of automation, Selas custom-builds specialized equipment designed to accommodate the individual workpiece. Send for informative articles describing in more detail the above applications and for information on Selas Gradiation fast heating. Address Dept. 12.

Selas engineers will be glad to discuss your heat-treating needs with you.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers
DEVELOPMENT • DESIGN • CONSTRUCTION





At a ganister rock quarry on Dunnings Mountain, one of two Plymouths owned by J. L. Hartman Company is shown hauling heavily loaded cars over 5 miles of curved track with grades as steep as 8%.

"Saving time and money with our PLYMOUTH"

...the comment most users make First!

Plymouth's reliable efficiency is making continuous hauling, switching and spotting jobs more profitable for large and small companies throughout industry. Any user will tell you that substantial fuel savings per ton of material hauled is a universal benefit in Plymouth models from 3 to 80 tons.

Whether your haulage needs call for gasoline or Diesel operation, mechanical or torque-converter drive, Plymouth has the exact size and model to fit your operation. They'll expedite your production and work around the clock at surprisingly low operating and maintenance costs.

You will get all the facts promptly if you send a brief outline of your haulage needs to Plymouth Locomotive Works, The Fate-Root-Heath Company, Dept. A-2, Plymouth, Ohio.

*"Quicker and more efficient
in every way than our former
locomotive"*

—reports Mr. J. L. Hartman, Mgr.
J. L. HARTMAN COMPANY
Hollidaysburg, Pa.

"Plymouth Diesel operation is so superior there's no comparing it in cost with our previous steam equipment," Mr. Hartman told us, "and down-time for maintenance hardly averages 2 hours a month!"

PLYMOUTH[®] LOCOMOTIVES

WITH TORQOMOTIVE DRIVE

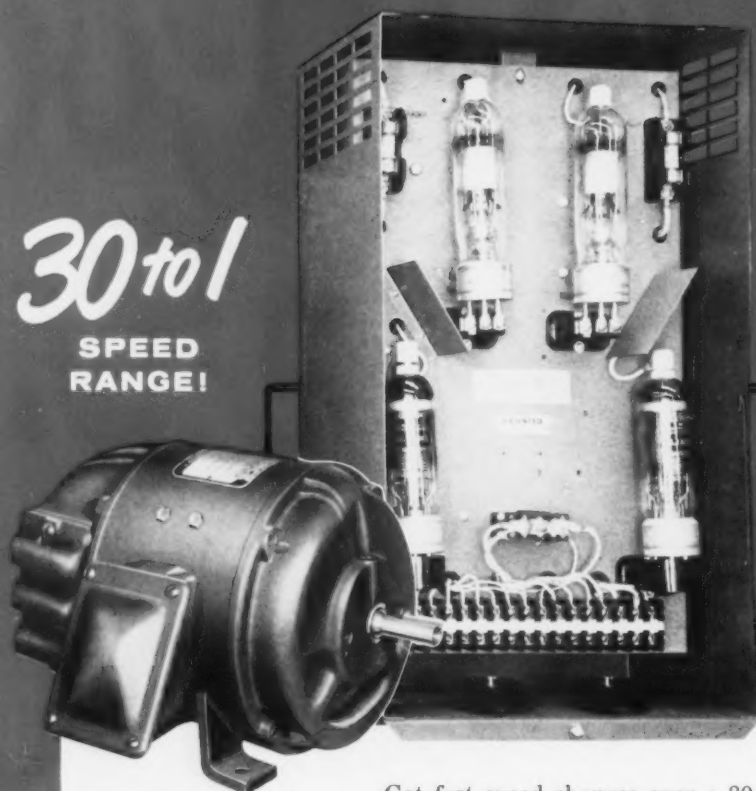
RAIL
POWER

PLYMOUTH LOCOMOTIVES—
in PROGRESSIVE INDUSTRY
throughout the WORLD

ALSO BUILDERS OF
F-R-H CERAMIC MACHINERY

NEW RELIANCE V★S Jr.

30 to 1
SPEED
RANGE!



FINGER
TIP
CONTROL!

Get fast speed changes over a 30 to 1 range with this all-electric variable speed drive.

The new V★S Jr. gives you instantaneous speed changes, even under load, without belts, pulleys, or gears. This Reliance Drive puts the complete machine operation at the operator's fingertips. All functions, jog, start, stop, reverse and speed changes, are placed in a compact, remote control station.

There's a big power cushion in the motor, too . . . power for smooth speed pick up, even under heavy shock loads, and dynamic braking for fast controlled stops without shuddering or jerking.

The Reliance V★S Jr. is your answer to machinery drive problems in the $\frac{1}{4}$ to 4 horsepower range. Package construction makes installation easy; just plug it in to a single phase 220 or 440 volt a-c. line.

Write for complete details and prices.

(D-1539)

RELIANCE  ELECTRIC
AND ENGINEERING COMPANY

DEPT. 22A, CLEVELAND 17, OHIO • CANADIAN DIVISION: WELLAND, ONTARIO
Sales Offices and Distributors in Principal Cities



"Your company will go all-out to give the best possible service"

These are the words of Fred O. Reedy, president of Kennedy-Van Saun Mfg. & Engineering Corporation, Danville, Pa. He was writing about two seamless steel rings his company required to complete a huge rotary cooler.

The larger of the two rings called for an outside diameter of 109½ in.; the other for one only slightly smaller. We forged them of special-analysis steel made in our own plant, rolled them to shape, quenched and tempered them for the right hardness and other physical characteristics—then finish-machined them to close tolerances—and got them to our customer on time.

The compliments from Mr. Reedy are among hundreds along the same lines in our files. We can be proud of the products we manufacture and the good service we provide—service we believe not many mills can match.

Write Dept. 1B today for the story on special-order rings, flanges and open-die forgings by Standard Steel.



"When our Purchasing Department explained the importance of this emergency job and stated how badly we needed these forged steel rings, you agreed to supply them in 2 weeks' time and your shipment was right on schedule."

Standard Steel Works Division **BALDWIN · LIMA · HAMILTON**

BURNHAM, PENNSYLVANIA

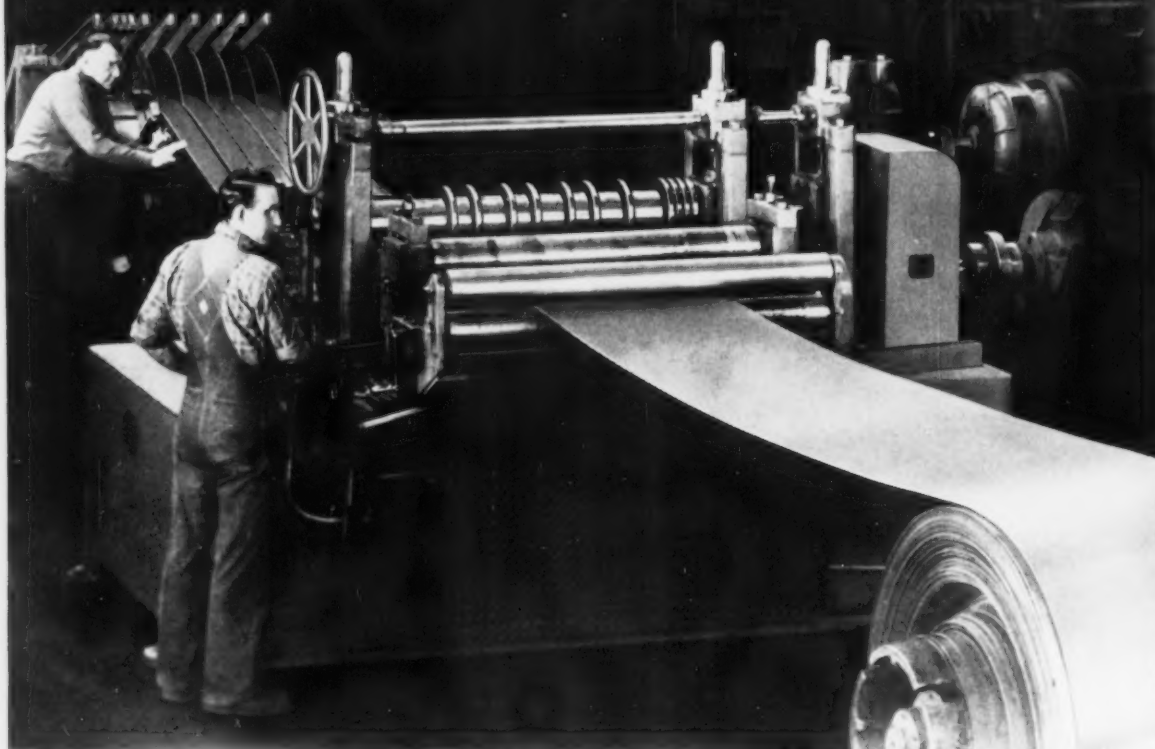
Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes



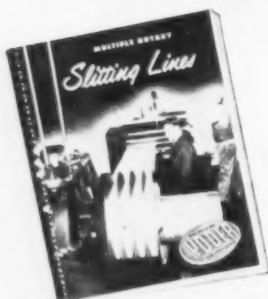
February 7, 1957

33

YODER SLITTING LINES



pay big dividends working only one day per week!



The Yoder Slitter Book is a comprehensive treatise on slitter operation and economics, with time studies, cost analyses and other useful data. It is yours for the asking.

In one plant, two Yoder tube mills and about 50 punch presses are being supplied with slit strands by one Yoder Slitting Line operated an average of only *seven hours per week*.

In another plant, a Yoder slitting line, *operated from six to eight hours per week*, is supplying two intermittently operated roll forming machines with total requirements averaging 100,000 feet per week.

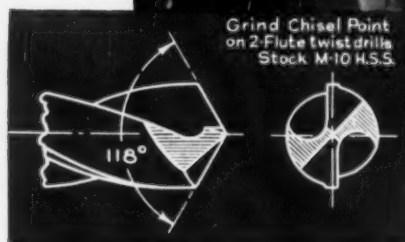
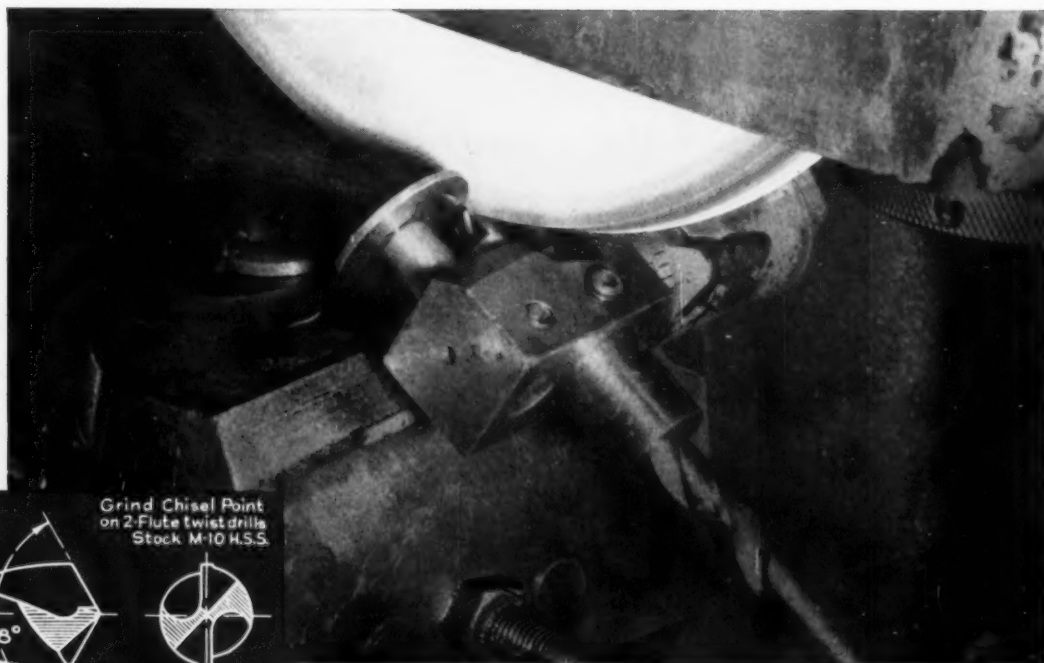
These typical examples demonstrate, first, the big potential output of a relatively small, inexpensive Yoder standardized Slitting Line and, secondly, its big profitability. Assume production of only 35 tons of slit strands per 8 hour shift, one day per week, and the total per year would be 1750 tons. Estimating the saving in slitting cost at only one-half cent per lb., the total annual saving would be \$17,500.00.

Besides the big convenience of doing your own slitting, such savings will often repay the investment in a few months.

THE YODER COMPANY 5510 Walworth Avenue • Cleveland 2, Ohio, U.S.A.



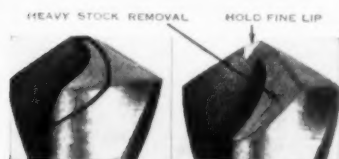
ROTARY SLITTING LINES
COLD ROLL FORMING MACHINES
ELECTRIC-WELD PIPE AND TUBE MILLS



A GRINDING PROGRESS REPORT

Bay State Engineer Finds Way to Triple Production on Chisel Point Grinder

The special "chisel point" on a twist drill makes it start faster in hard materials. Grinding it in one cut and at production rates presents a difficult wheel selection problem, as shown.



For one manufacturer, neither wheels soft enough for the heavy cut nor those hard enough for the fine cutting of the lip could meet the production and quality standards. Expensive overtime shifts were being worked when Bay State was called in.

Bay State District Manager Bob Belmont saw, in this one operation, two grinding tasks so different that one set of wheel "specs" could not possibly do them both.

The "sandwich" wheel illustrated below, with two layers of different abrasives, was his answer. The hard (P grade), fine (220 grit) layer grinds the fine lip. The coarser (150 grit), softer (N grade) side does the heavy cutting.



Bob Belmont demonstrated capable engineering in action. He tripled production, reduced rejects, eliminated overtime, and lowered grinding costs.

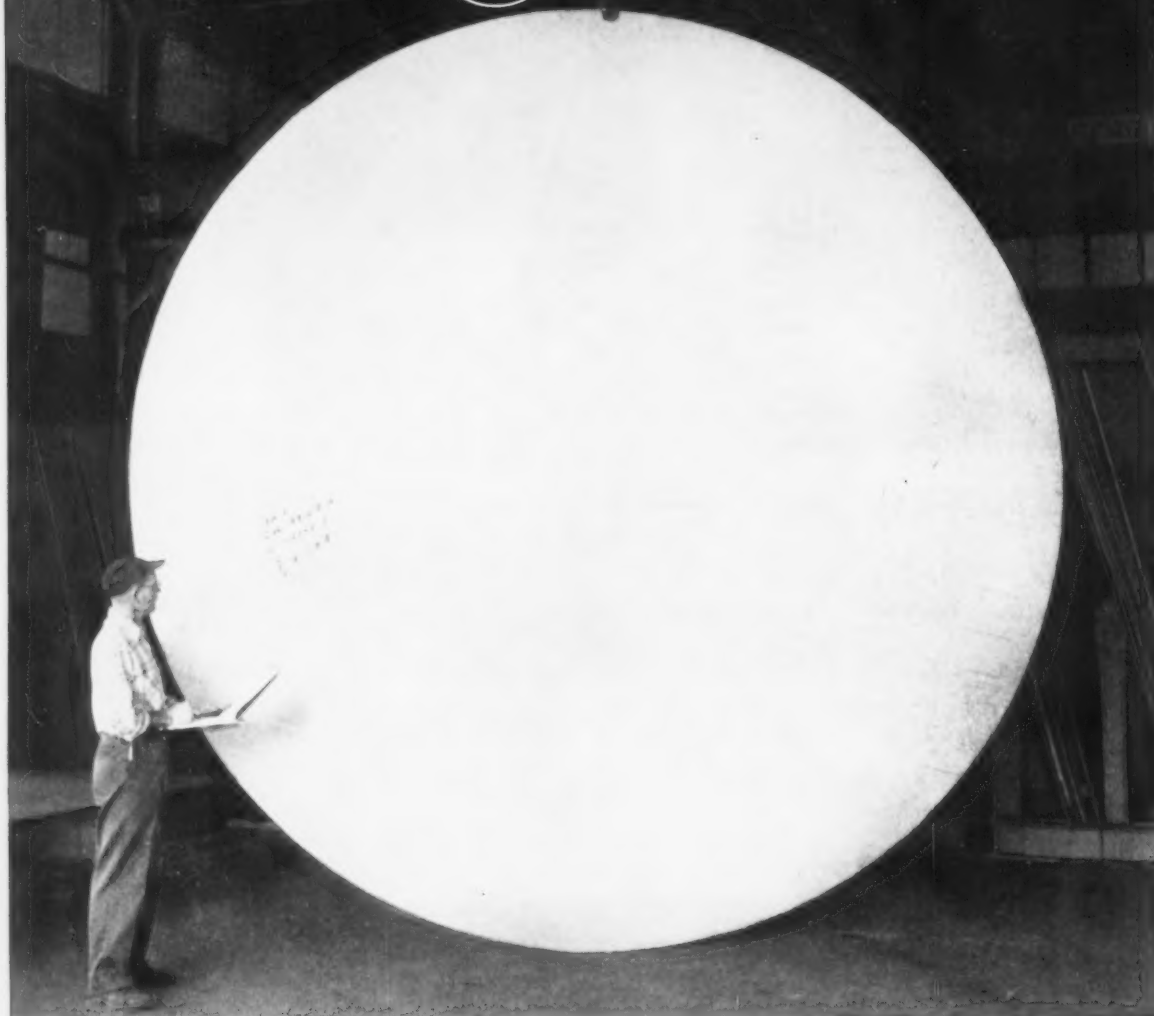
To get such effective engineering aid, contact any distributor or office of the Bay State Abrasive Products Company, Westboro, Massachusetts.

Branch Offices are located in Bristol, Conn.; Chicago, Ill.; Cleveland, Ohio; Detroit, Mich.; Pittsburgh, Pa.; with distributors in all principal cities.

In Canada: Bay State Abrasive Products Co.; (Canada) Ltd., Brantford, Ont.



WHY BUY STAINLESS STEEL squares WHEN IT'S circles YOU NEED?



This circle, $\frac{9}{16}$ " thick x 164" diameter, is one piece of Type 316L stainless steel. Had the customer ordered a square, he would have paid freight on a half-ton of excess material. Also, he would have had the problem and expense of handling the square and cutting the circle.

Here are four sound reasons why Carlson customers save time and money when they order the circles they want—rather than the squares they have to cut . . .

1. If the gauge and size are circle-shearable, there is no extra charge for cutting the circle. This saves cutting labor and scrap handling expense.
2. If the gauge is such that a cutting charge applies to the square, it pays

to order the circle. This eliminates the extra charge for cutting the original square and involves only the one charge for cutting the circle.

3. Because circles weigh approximately

25% less than squares, there's a substantial saving in transportation costs.

4. Small or medium size circles are often available from stock when squares may not be. The delivery time saved can be an important factor.

When you need stainless steel circles, come to Carlson where we specialize in stainless steel . . . that's your guarantee of dependable service.

Stainless Steels Exclusively
CARLSON Inc.
THORNDALE, PENNSYLVANIA
District Sales Offices in Principal Cities

Plates • Plate Products • Forgings • Bars • Sheets (No. 1 Finish)

FREE

New Refractories Handbook

written especially for electric furnace operators

This new booklet is the most important "how to" handbook on refractories installation methods ever written for electric steel-making furnace operators.

Many of the suggestions and recommendations in this 48-page booklet have come from our customers, who cooperated in joint studies of

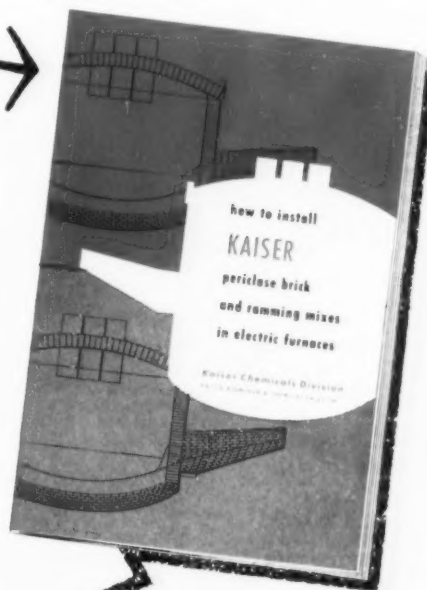
basic brick and ramming mixes in their electric steel furnaces.

All of the recommendations are designed to help you get the greatest savings and the best possible service from proper installations of refractory brick and furnace grains.

*this "How To" handbook
shows you ...*



- Methods for installing basic brick •
 - Sub-hearth construction •
 - Side wall construction •
 - Lining around doorway •
 - Lining pouring spouts •
 - Roof seal •
- Methods for installing ramming mix •
 - Hearth contour •
 - Tap hole construction •
 - Ramming bottoms •
 - Mixing methods •
 - Ramming small furnaces •
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Now — Cleveland provides a single source for all your socket screw requirements

Simplifies specification, cuts paper work, speeds delivery

CLEVELAND STANDARD SOCKET SCREW PRODUCTS UNIFIED THREADS—CLASS 3A FIT

Type	Standard Sizes (diam.)	Material
Socket head cap screws	#0 to 1½ in. (larger sizes avail.)	Alloy steel, heat treated or Nonmagnetic 18-8 stainless
Set screws (cup, half dog, flat, cone or oval points)	#0 to 1 in. (#0-#3, cup point only)	Alloy steel, heat treated or Nonmagnetic 18-8 stainless (to ½ in., cup point only)
Flat head socket cap screws	#4 to ½ in.	Alloy steel heat treated
Button head socket cap screws	#4 to ½ in.	same
Shoulder screws (stripper bolts)	¼ to ½ in.	same
Dowel pins	¼ to 1 in. (nominal size and .001 in. oversize for repair)	same
Pressure plugs	¼ to 1½ in. NPTF	same
Socket screw keys	.028 to 1 in. across flats, short or long arm	same

Cleveland has expanded its socket screw line to provide a single source for all your socket head needs.

At the same time, and in conjunction with opening its new plant, Cleveland is doubling its factory warehousing capacity. This, plus the latest materials handling equipment, will enable Cleveland distributors to get same-day shipment of your larger orders.

Included in the expanded Cleveland socket screw line are precision dowel pins. While not a socket head product, they are basic fasteners for the important tool and die industry, where they are closely associated with socket head cap screws and shoulder screws. We offer them as part of a complete service.

Cleveland socket head cap screws are upset forged from heat-treated alloy steel. This results in symmetrical, unbroken grain structure in heads, threads and fillets—greater fatigue and tensile strength, stronger fasteners.

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Weirzin is available with or without chemical treatment in coils or cut lengths, in all regular widths and gauges. If you would like specific information on the many ways in which Weirzin may benefit your product, please fill in and mail coupon (right) today.



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One Shear Takes the Place of Two or Three



No. 12E-12 Steelweld Shear at U. S. Steel Supply, Seattle, Washington, rated for steel plate 12' x 3/4". Being cut in photo is a plate, size 7' x 30' x 3/4". With hand crank on right end, this machine can be adjusted in a few seconds to have exactly the right knife clearance to obtain the finest cut for any thickness. To make this adjustment on guillotine-type shears usually requires several hours.

MANY steel warehouses have two and often three shears, one of a 1/4" capacity for lighter thicknesses, another of 1/2" capacity for cutting 1/4" to 1/2" material, and a third with 1" capacity for thicknesses over 1/2" and up to 1". At some of its warehouses, U. S. Steel Supply uses only one machine for cutting the various thicknesses—a Steelweld Pivoted-Blade Shear.

One machine takes the place of two or three,

because it is so easy to adjust the knife clearance required to obtain the best cuts for different thicknesses, which can range from lightest gauge metal to the heaviest plate within the capacity of the shear.

Thus, the investment in shearing equipment is kept low, yet the customers of U. S. Steel Supply are always assured of straight, smooth, accurately cut metal on every order.



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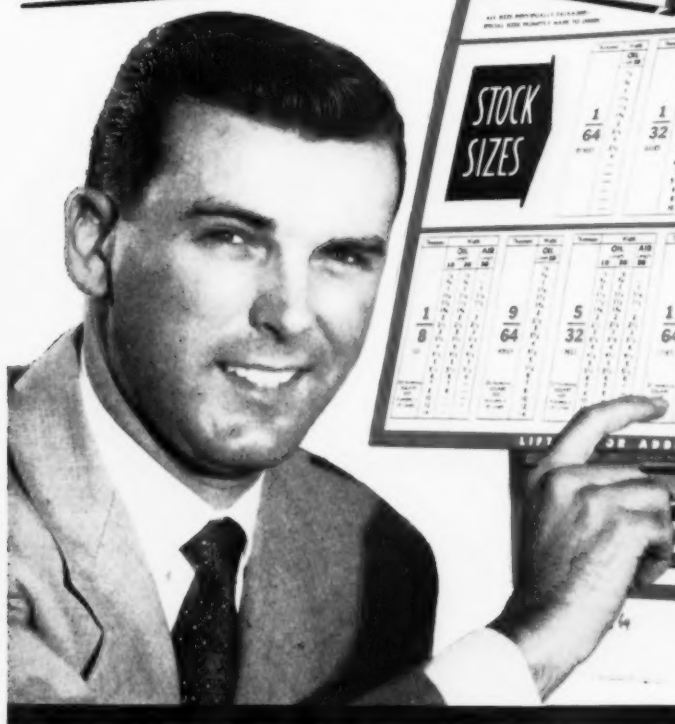
CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

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IMMEDIATE DELIVERY
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SIMONDS
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STOCK SIZES

Width	Thickness	Weight	Width	Thickness	Weight	Width	Thickness	Weight	Width	Thickness	Weight
1	1/64	1.0	1	1/32	1.0	3	1/64	1.0	5	1/64	1.0
1	1/32	1.0	3	1/32	1.0	5	1/32	1.0	7	1/32	1.0
1	1/16	1.0	3	1/16	1.0	5	1/16	1.0	7	1/16	1.0
1	3/32	1.0	3	3/32	1.0	5	3/32	1.0	7	3/32	1.0
1	1/8	1.0	3	1/8	1.0	5	1/8	1.0	7	1/8	1.0
1	3/16	1.0	3	3/16	1.0	5	3/16	1.0	7	3/16	1.0
1	1/4	1.0	3	1/4	1.0	5	1/4	1.0	7	1/4	1.0
1	5/16	1.0	3	5/16	1.0	5	5/16	1.0	7	5/16	1.0
1	3/8	1.0	3	3/8	1.0	5	3/8	1.0	7	3/8	1.0
1	7/16	1.0	3	7/16	1.0	5	7/16	1.0	7	7/16	1.0
1	1/2	1.0	3	1/2	1.0	5	1/2	1.0	7	1/2	1.0
1	5/8	1.0	3	5/8	1.0	5	5/8	1.0	7	5/8	1.0
1	3/4	1.0	3	3/4	1.0	5	3/4	1.0	7	3/4	1.0
1	7/8	1.0	3	7/8	1.0	5	7/8	1.0	7	7/8	1.0
1	1	1.0	3	1	1.0	5	1	1.0	7	1	1.0

ADDITIONAL STOCK SIZES

Width	Thickness	Weight	Width	Thickness	Weight	Width	Thickness	Weight	Width	Thickness	Weight
1	1/64	1.0	1	1/32	1.0	3	1/64	1.0	5	1/64	1.0
1	1/32	1.0	3	1/32	1.0	5	1/32	1.0	7	1/32	1.0
1	1/16	1.0	3	1/16	1.0	5	1/16	1.0	7	1/16	1.0
1	3/32	1.0	3	3/32	1.0	5	3/32	1.0	7	3/32	1.0
1	1/8	1.0	3	1/8	1.0	5	1/8	1.0	7	1/8	1.0
1	3/16	1.0	3	3/16	1.0	5	3/16	1.0	7	3/16	1.0
1	1/4	1.0	3	1/4	1.0	5	1/4	1.0	7	1/4	1.0
1	5/16	1.0	3	5/16	1.0	5	5/16	1.0	7	5/16	1.0
1	3/8	1.0	3	3/8	1.0	5	3/8	1.0	7	3/8	1.0
1	7/16	1.0	3	7/16	1.0	5	7/16	1.0	7	7/16	1.0
1	1/2	1.0	3	1/2	1.0	5	1/2	1.0	7	1/2	1.0
1	5/8	1.0	3	5/8	1.0	5	5/8	1.0	7	5/8	1.0
1	3/4	1.0	3	3/4	1.0	5	3/4	1.0	7	3/4	1.0
1	7/8	1.0	3	7/8	1.0	5	7/8	1.0	7	7/8	1.0
1	1	1.0	3	1	1.0	5	1	1.0	7	1	1.0

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(HIGH GRADE ALLOY TOOL STEEL)

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That's what you'll get at Crucible—no matter how big or small your special steel needs may be.

Crucible warehouses are conveniently located all across the country—to supply the widest assortment of special steels, when you need them.

Deliveries are dependable, service something special—because Crucible is *big enough to serve you, small enough to want to.*

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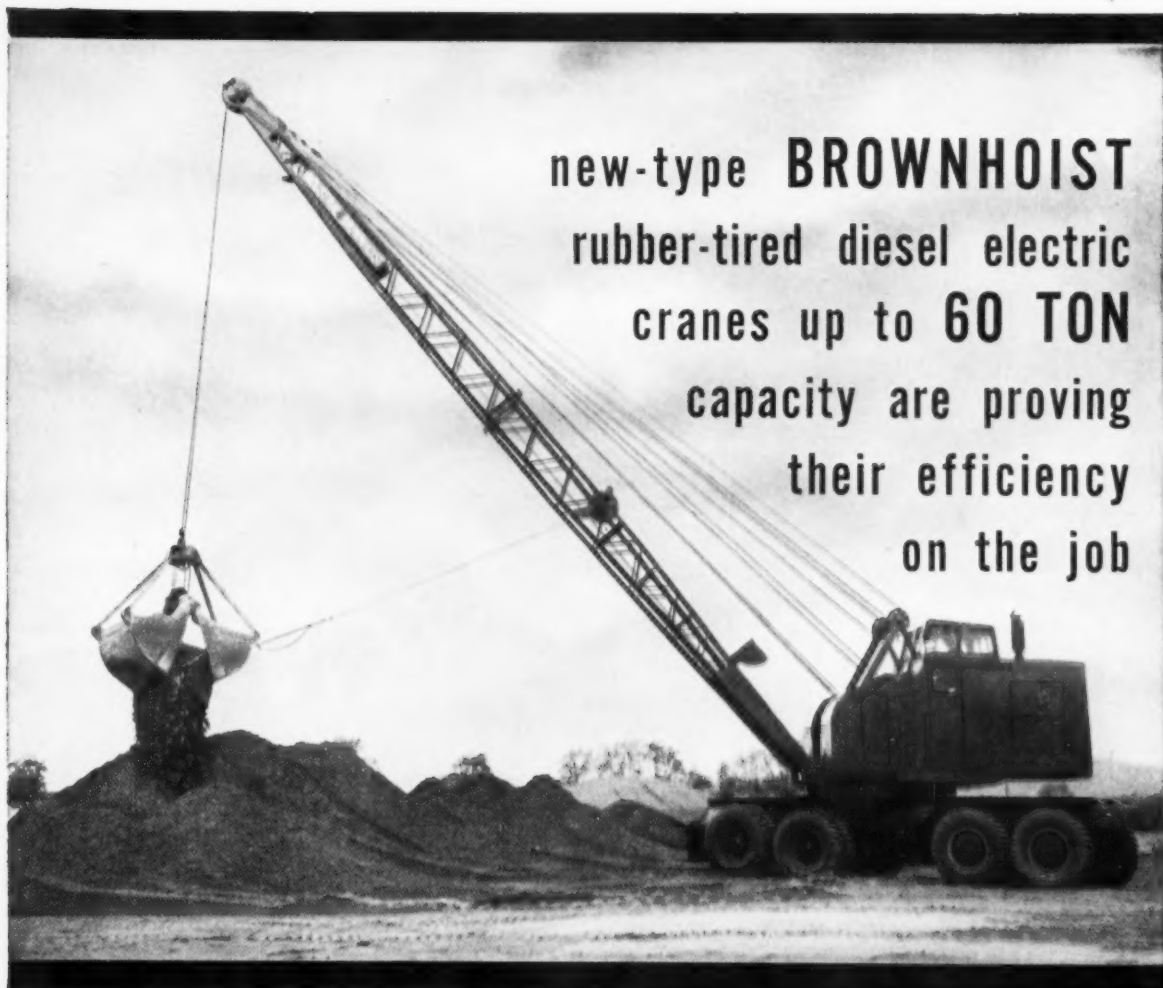
Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

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new-type **BROWNHOIST**
rubber-tired diesel electric
cranes up to **60 TON**
capacity are proving
their efficiency
on the job

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HANDLING EQUIPMENT
GIVES A LIFT TO
AMERICAN INDUSTRY**



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The new Brownhoist Wagon-Cranes are specifically designed to do an outstanding job wherever high mobility and high capacity are required. You'll see them at work performing heavy duty jobs in mines, quarries, steel mills, for railroad and lumber operations and for many other large industries. Equipped with dynamatic clutch, anti-friction bearings at all essential points, power steering, electric travel and electric rotation. Mounted on a 12 wheel crane carrier capable of speeds up to 8 miles per hour, the unit can be operated by one man from easy-to-reach controls. Economical to operate. Available in capacities from 25 to 60 tons. For specification folder or further details, get in touch with our nearest representative or write us at Bay City.

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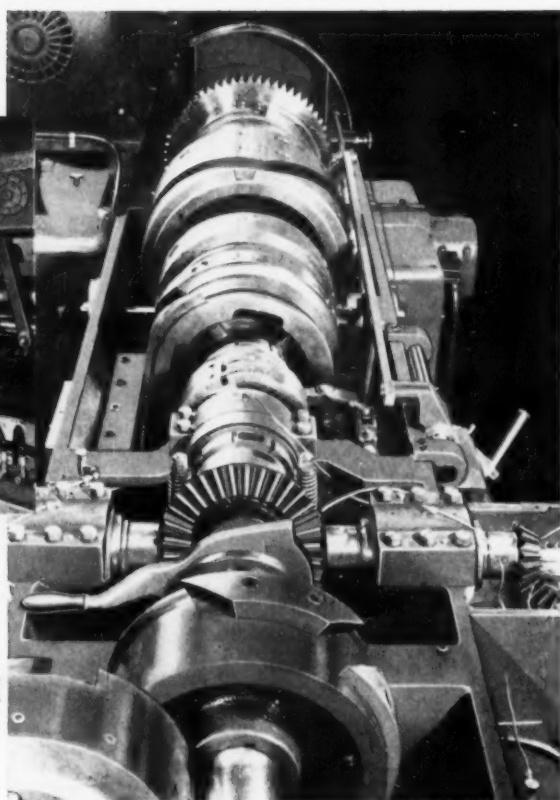
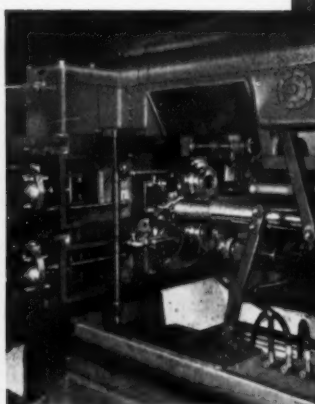
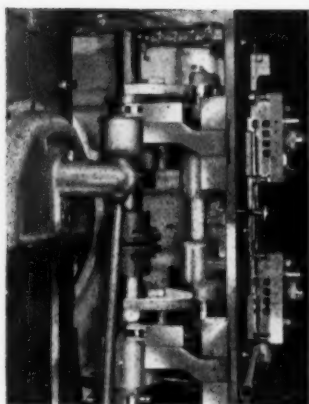
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Conomatics Provide Radial Screw Adjustment of Forming Tool Slides

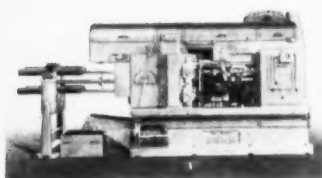
- Models 2 $\frac{5}{8}$ " LA, 3 $\frac{1}{2}$ " AD, 5" KL, and 5 $\frac{1}{4}$ " KR Conomatic Four Spindle Bar Machines are equipped with a number of quick job-change features. One of these is the all-position end attachment drive for the mounting of endworking opposed spindles in all positions, with independent feed to as many as three opposed spindles on a single setup.

Another feature that is of considerable importance in tooling up is the radial screw adjustment of all sideworking slides. Trial cuts may be taken to correct diameters with form tools without changing the clamped positions of the form tool holders.

All Conomatic quick changeover models are equipped with dial adjustment of the working stroke of all tool carrying slides.

Besides the Four Spindle machines there are three quick change Six Spindle models in $\frac{9}{16}$ ", 1" and 1 $\frac{5}{8}$ " sizes.

Write, wire, or phone for literature.

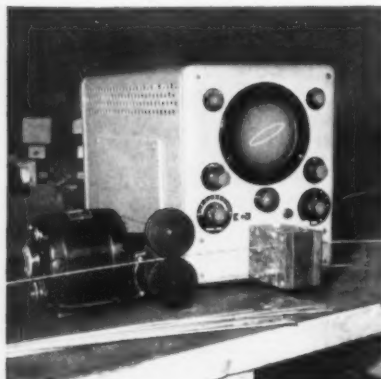


Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.



SPOTCHECK PINPOINTS DANGER AREAS in heavy machinery and operating equipment. The Spotcheck dye penetrant inspection kit is excellent for testing during maintenance, or for intermittent spot testing for cracks and other surface defects. Kit contains all materials, in easy-to-use pressurized spray cans plus a handy, lightweight carrying case.



NOW YOU CAN "SEE" DEFECTS in wires, rods and tubes of low conductivity metals such as aluminum, tungsten or uranium. The FW-200 Series unit sets up eddy-currents in the test materials. Using frequencies from 15 KC to 2 MC, any cracks, splits or seams are detected and easy-to-read indications are shown on the TV-type picture tube. Diameter changes register separately. Adjustments can be made for a visible signal and automatic rejection of defective materials.

HALLMARK
OF QUALITY IN
NONDESTRUCTIVE
TEST SYSTEMS



Write for complete details concerning any of the above case studies, or ask for our new booklet on "Lower Manufacturing Costs."

Case Studies: NONDESTRUCTIVE TESTING SYSTEMS



Type ZA-29 Zyflo unit is widely used and accepted for detecting surface defects in aluminum magnesium, brass and titanium parts.

How Production, Payroll and Public Relations Can Benefit from "Early-Stage" Testing

The most for the least, that's what your customers want today. To help answer these demands and still show a profit, you can increase the output and quality of production without increasing costs and facilities.

By supplying process control and by maintaining consistent quality standards, Magnaflux nondestructive testing systems provide a quick, accurate, economical production tool. They can increase output and lower your operating costs. M methods save money by keeping production at a dependable level.

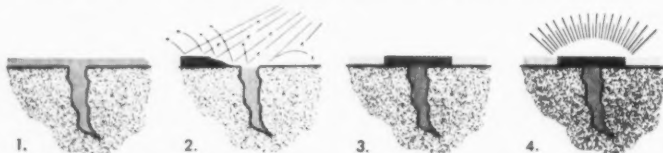
M methods provide an "early-stage" test for the detection of surface defects in all magnetic and non-magnetic metals, ceramics, glass and other solid materials. "Early-stage" testing pinpoints improper proce-

dures and corrective steps can be taken to eliminate the manufacture of defective parts. Where serious defects do occur, parts can be rejected before further effort is wasted on additional processing. When defects are minor, repairs can be made to decrease scrap losses and upgrade salvage operations.

"Early-stage" testing with M methods pays in many ways. It increases usable production output, it prevents unnecessary payroll costs on defective materials, it protects your reputation by insuring consistent quality, all of which means dollar savings to you!

Find out how low-cost Magnaflux non-destructive test methods can help protect your company's quality, pocketbook and name. Write, or call on a Magnaflux testing systems engineer today.

HOW ZYGLO FINDS CRACKS IN NON-MAGNETIC PARTS



1. A surface film of Zyflo penetrant is applied to parts by dipping, spraying or brushing. After this application, penetrant enters any surface opening, cracks or pores, and excess penetrant is allowed to drain off. 2. Parts are then washed with a water spray, and permitted to dry.

3. Next, parts are dipped in a developing powder. This acts as a blotter, and draws the penetrant to the surface. 4. Look at the part under "black light". Any crack or surface defect will show up as a glowing fluorescent indication that is impossible to miss. Scratches will not be shown.

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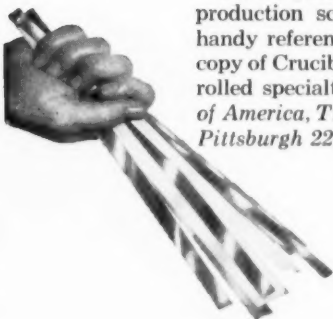


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of cold rolled specialty steels
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Crucible is geared to give you *reliable, on-time deliveries* of a wide variety of cold rolled specialty steels—carbon spring, alloy strip . . . coils or cut lengths . . . in the size, finish and temper you specify.

And you're sure of *quality* from Crucible—*fine finish . . . better edges . . . improved flatness*.

So, for prompt deliveries, timed to meet your production schedules—call Crucible. And, for handy reference—mail the coupon for your free copy of Crucible's 32-page fact-filled book on cold rolled specialty steels. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*



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I'd like a copy of your 32-page booklet on cold rolled specialty steels.

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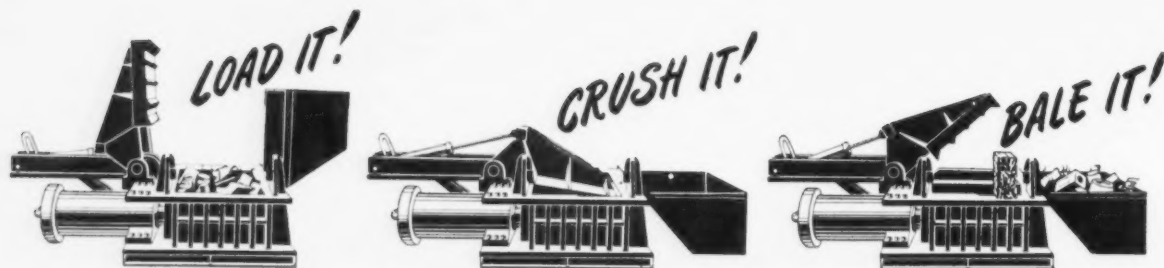
CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

February 7, 1957

47



We Build the Dempster-Balester to Load It, Crush It, Bale It— Bale After Bale After Bale

You not only get the nearest thing available to automatic baling when you buy a Dempster-Balester, but you get a press built to take the punishment of scrap metal baling consistently day-in and day-out . . . bale-after-bale-after-bale! The first Dempster-Balester was built in 1940 and it is still in operation. Today, hundreds of Dempster-Balesters are making money for men like yourself in over 200 cities in almost every state of the union, plus 15 foreign countries.

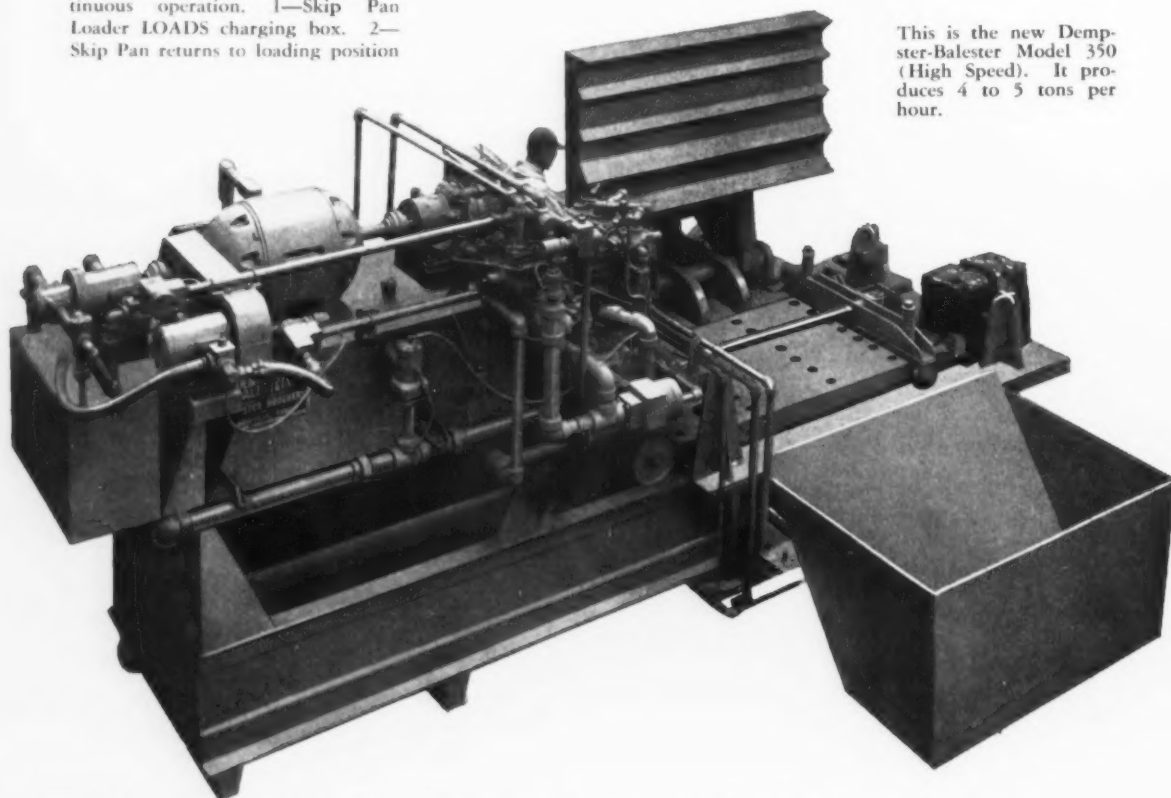
The Dempster-Balester's LOAD IT, CRUSH IT, BALE IT cycle (illustrated above) is a simple 1-2-3 continuous operation. 1—Skip Pan Loader LOADS charging box. 2—Skip Pan returns to loading position

and Auxiliary Compression Door CRUSHES scrap with a 45-ton force. 3—As Compression Door returns to up-right position, charging box door closes . . . scrap is BALED and ejected. As each cycle ends another begins.

Without question, Dempster-Balesters are the fastest, most efficient presses baling scrap metal today! And you have six to choose from—three standard and three high speed models that turn out high density bales in capacities to meet any requirement from 1 to 9 tons per hour.

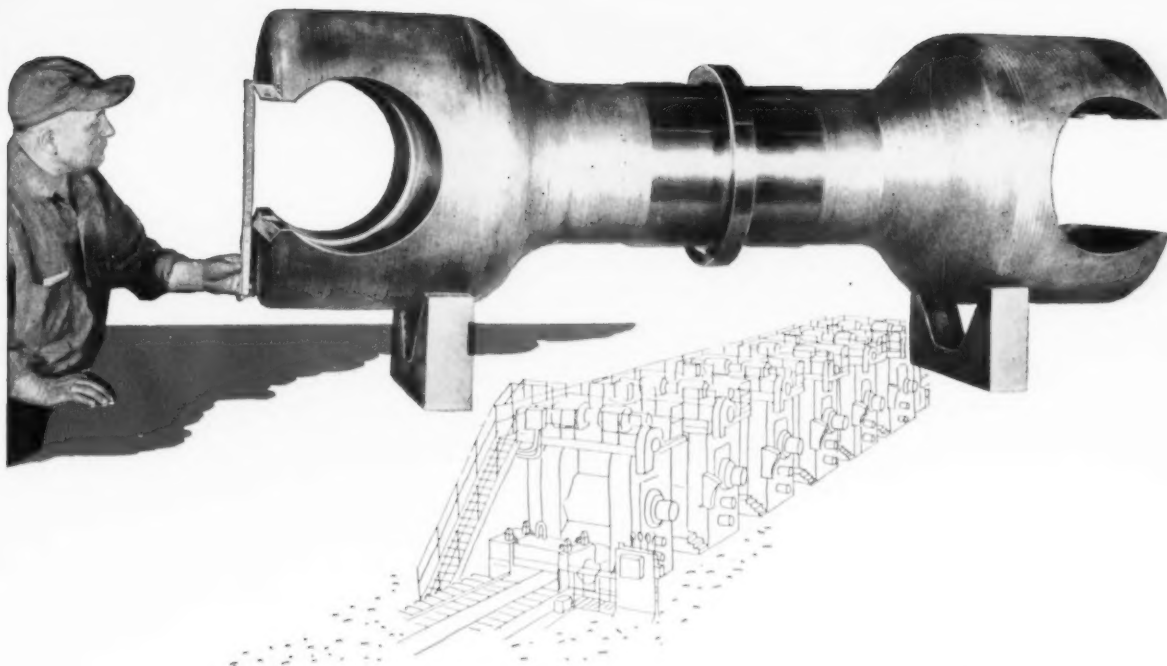
And don't overlook this important point. Before buying a baling press, it's important to know what kind of service you can expect. Certainly, no piece of heavy machinery can operate consistently without maintenance. Breakdowns cost money and when a part is needed for one of our presses, it is usually shipped the day your order is received. An ample stock of repair parts is constantly maintained to take care of you promptly! Write to us today for complete information.

A product of Dempster Brothers, Inc.



This is the new Dempster-Balester Model 350 (High Speed). It produces 4 to 5 tons per hour.

DEMPSTER BROTHERS, 417 N. Knox, Knoxville 17, Tennessee



SAVE MONEY with FINKL FORGINGS

Strip mills do!

They increase life and therefore reduce "down time" with Finkl finish machined spindles, once again proving that the best costs the least in the long run.

A typical example is this 98" spindle, weighing 5900 pounds, which began as a 13,000 pound forging from a 50,000 pound ingot out of our own melt shop. The utmost consideration for the spindle's end use set up the quality control program before the furnace electrodes started to arc. Then through forging, heat treating, rough and finish machining, and final inspection, each department head and his crew of craftsmen guided the program to its specified completion.

When you are considering cylinders, spindles, driveshafts, or any special purpose forging, whether rough turned or finish machined, call your local Finkl representative. He will be glad to help you plan, or call upon the more than 78 years of Finkl experience to save you money and give you the finest forgings, or die blocks, available.

• DIE BLOCKS •
ELECTRIC FURNACE STEELS
• FORGINGS •
HOT WORK STEELS •



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February 7, 1957

49

for steel or non-ferrous metals

Now...

6

SPECIAL TITANIUM ALLOYS

Whatever your low-carbon titanium requirement, there's an ELECTROMET titanium alloy to suit your melting practice. ELECTROMET produces three standard grades of low-carbon ferrotitanium, each grade containing a maximum of 0.10 per cent carbon.

Of special interest to producers of high-quality forgings are the low aluminum and silicon contents of this alloy, which make ELECTROMET ferrotitanium specially suited for the production of forgings having good mechanical properties.

Silicon-titanium is available for adding titanium to either non-ferrous alloys or steels where the simultaneous addition of silicon is desired. Manganese-nickel-titanium is available for adding titanium to nickel-base high-temperature alloys. Aluminum-titanium is a special alloy for the titanium metal industry.

For additional information about ELECTROMET titanium alloys, please contact the nearest ELECTROMET office listed below.

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FERRO-ALLOYS AND METALS

ELECTROMET LOW-CARBON FERROTITANIUM

ELEMENT	30% Titanium Grade	50% Titanium Grade	70% Titanium Grade
Titanium	27-32%	50-55%	68-72%
Aluminum	0.15% max.	0.15% max.	0.15% max.
Silicon	0.10% max.	0.10% max.	0.10% max.
Carbon	0.10% max.	0.10% max.	0.10% max.
Size	2 in. x Down	2 in. x Down	2 in. x Down

OTHER TITANIUM ALLOYS

Silicon-Titanium

Titanium	40-50%
Silicon	45-50%
Iron	3.00% max.

Sizes: 2 in. x Down
1 in. x Down
20 Mesh x Down

Manganese-Nickel-Titanium

Titanium	46.5-48.5%
Manganese	6-8%
Nickel	29-31%
Aluminum	12.5-14.5%

Size: 2 in. x Down

Aluminum-Titanium

Regular Grade

Titanium	50 to 60%
Aluminum	40 to 45%
Silicon	1.50% max.
Iron	2.00% max.

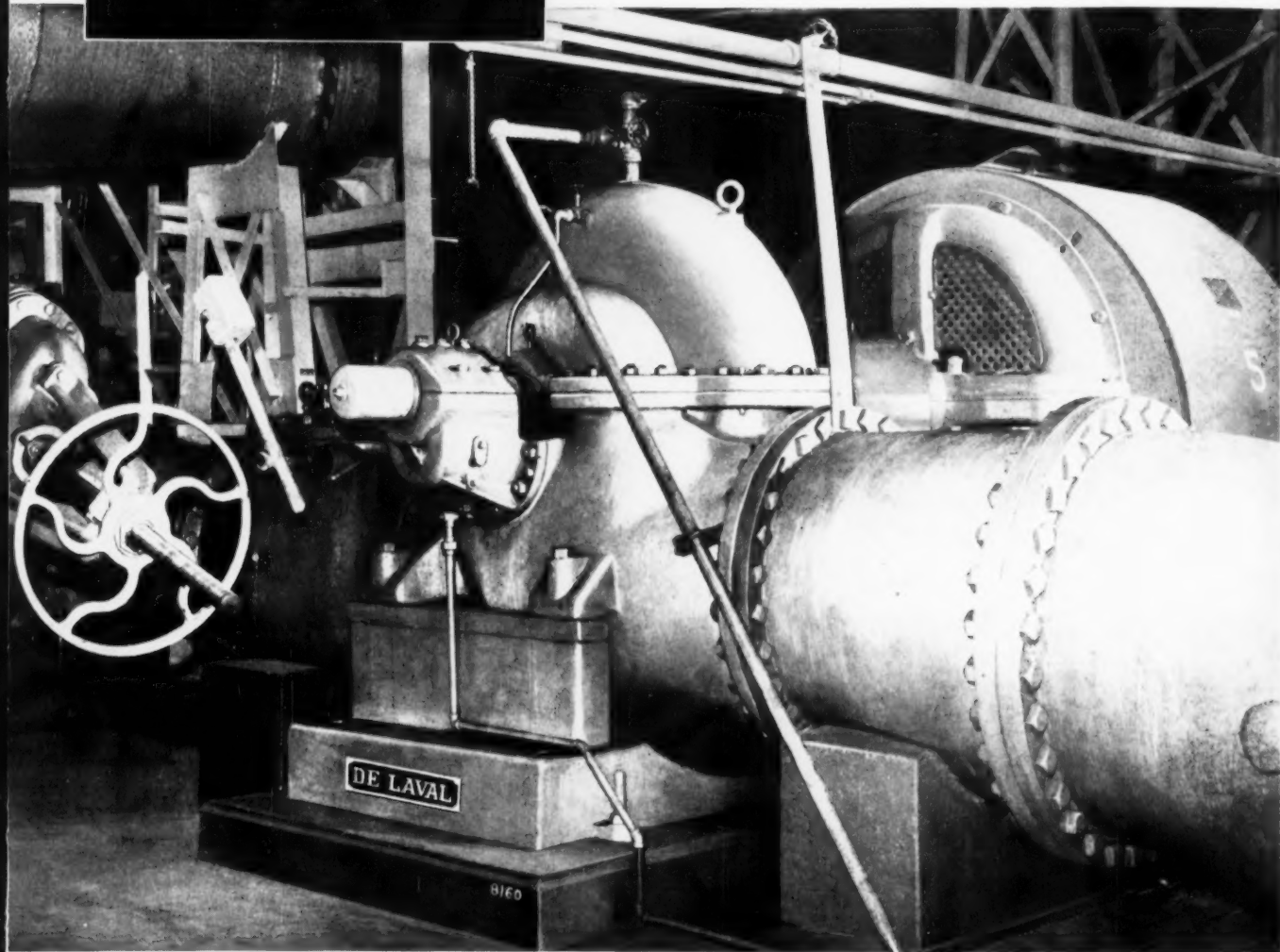
High-Purity Grade

Titanium	50 to 55%
Aluminum	44 to 49%
Silicon	0.25% max.
Iron	1.00% max.
Carbon	0.15% max.

Crushed Size: ¼ in. x Down

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CENTRIFUGAL
PUMPS

*in service since 1911
at Inland Steel Co.*



De Laval Centrifugal Pumps have a record of dependability at the Inland Steel Co., which goes back forty-five years. In that time, De Laval has supplied this major producer with pumps for practically every steel mill service—*more than 75 units in all*. The photograph shows one of the largest De Laval pumps on the line at the East Chicago, Indiana plant of Inland Steel. The unit delivers 20,000 gpm at 120 ft head.

De Laval Centrifugal Pumps are available for a wide range of applications in all types of metal-working plants. Types L, M and P single stage double suction pumps can handle capacities from 1,000 to 20,000 gpm and heads to 350 feet. Larger De Laval units of any capacity to meet any requirement for steel mill service are available.



*Send for Bulletin 1004
giving performance and
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DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY

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AMERICAN ORIGINALS IN IRON AND STEEL



How iron plates helped win the West

In the early 1800's, when Lewis and Clark made their historic pioneering trip across the continent, their supplies were limited to bare necessities. Strangely, however, among these necessities were a number of *small iron plates*.

The Indians of the Northwest valued these plates very highly. They would trade approximately a bushel of grain for a piece of iron only 4 inches square. This metal enabled them to make better axes, implements, and weapons . . . to be suddenly transferred from the Stone Age to the Iron Age. Thus *iron* became a

means of gaining the Indian's friendship, while indirectly helping to sustain the white man on his first coast-to-coast expedition.

The growth of our iron and steel industry, like the development of our country, also depended on the ingenuity of many men and the perfecting of many products. Among these products was Baker's MAGDOLITE, which today helps produce more uniform ingots . . . at lower refractory cost. It has proved superior in composition, preparation, strength, economy, and quality. Make a note of MAGDOLITE now . . . a name it will pay you to remember.

ANOTHER AMERICAN ORIGINAL

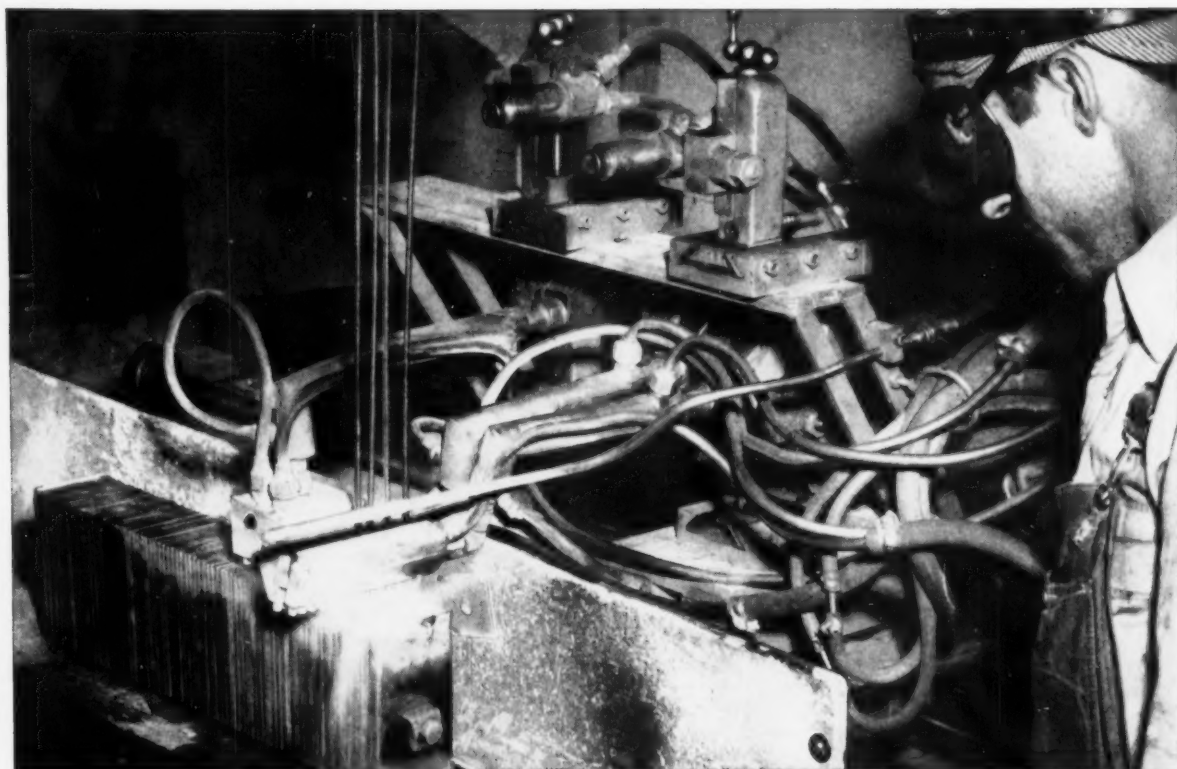


BAKER'S MAGDOLITE

The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO



Hammer Life Increased Four Times **by HARD-FACING**

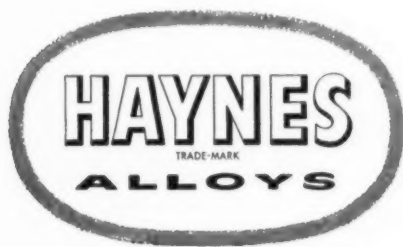
Hard-facing with HAYSTELLITE tube rod has increased the life of hammers used in a heavy duty grinder by four times. The hammers rotate at from 3000 to 3600 revolutions per minute while pulverizing metal turnings, limestone, glass, mica, and other severe abrasives. They are hard-faced mechanically on a model 800 straight-line machine. 70 hammers are processed at a time, and 1000 hammers are hard-faced in a normal working day.

HAYSTELLITE rod, the hard-facing material used on the hammers, forms an extremely hard surface that has good resistance to impact. It produces a deposit consisting of sharp, irregularly shaped particles of cast tungsten carbide

evenly distributed in a matrix of tough steel. The tungsten carbide particles resist abrasion, and the steel matrix cushions the effects of sudden shock.

There are 15 HAYNES hard-facing alloys . . . a wide selection that guarantees you the right rod at the right price for every wear problem. The HAYNES Hard-Facing Manual describes these alloys in detail, and outlines recommended procedures for applying them. We shall be happy to send you a copy upon request.

We also design and produce mechanized hard-facing equipment. For a description of the process and available equipment ask for "Mechanized Hard-Facing" Form 8564.



HAYNES STELLITE COMPANY

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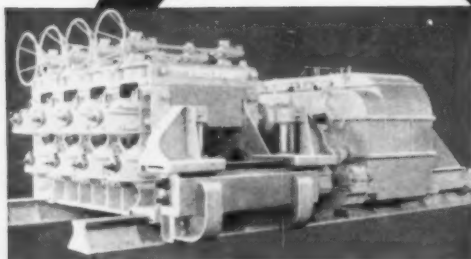


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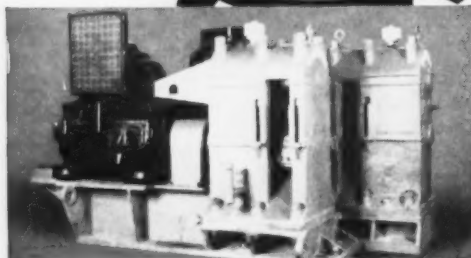
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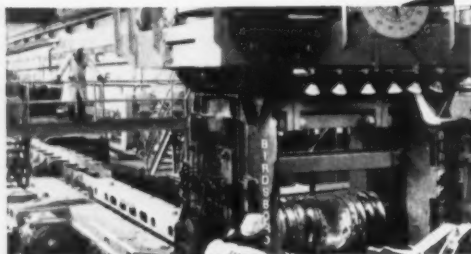
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for 100% of all metal cutting jobs

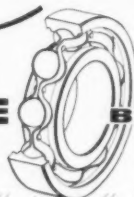
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FACTS

about

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BALL BEARINGS MAKE GOOD PRODUCTS BETTER

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

NEWSFRONT

Aluminum Zeroes in on Housing Market

With one entry already in the field, a second big aluminum company is reported to be readying a big push on the home building market. Alcoa—first to announce a program for increasing the use of aluminum in new homes—will build 50 new homes this year making extensive use of the metal. The company is also sponsoring conferences and committees to stimulate interest among architects, builders, fabricators.

Engineers' Pay: Problem Noted

Congress begins to see engineers' salary demands as a bigger factor in nationwide programs such as roadbuilding. Spot surveys show engineers earning from \$4000 up; averaging \$9140 in annual income. That's about \$1500 less than they think they rate. Chief complaint, aside from pay, is job assignment: More than half feel they're handling too-simple tasks.

For Springier Brass, Add Manganese

Recent research has aimed at improving the spring properties of 60/40 brass by adding a third alloying element. Additives checked included iron, manganese, aluminum and tin. Findings: For practical purposes, both manganese and tin additions proved preferable to iron. Manganese in particular definitely improved spring properties.

Better Electric-Truck Batteries?

Coming soon: Electric truck batteries offering 44 pct more rated capacity without any increase in size. Gain comes through use of porous plastic tubing on plates, which minimizes space normally needed at bottom of cell to accommodate particles "shed" from plates in service. The change permits use of larger plates in same case, to give the boost in rating.

Improves Ti Brakeforming Results

Titanium alloy detail parts are being brake-formed consistently—using an improved method—to the same predetermined angle of bend. Company concerned supplements conventional tools with carefully regulated resistance heating

and a special fixture. Trick lies, they report, in bringing part to temperature at just the right moment for forming. Results are reported reproducible over a 100 to 1400°F range.

Test Speeds Radioactivity Effects

Want a means for making fast checks on how radioactivity affects materials? Ford Motor Co. has developed a method for finding out; thus far, has used it only on quartz. To obtain effects equivalent to a full year's exposure in a nuclear reactor, the company subjects the material to a 10 second bombardment with electrically-charged atoms of hydrogen, oxygen or nitrogen. Test equipment can be of cheap materials.

Bulk Liquids "Roll" in Rubber Bags

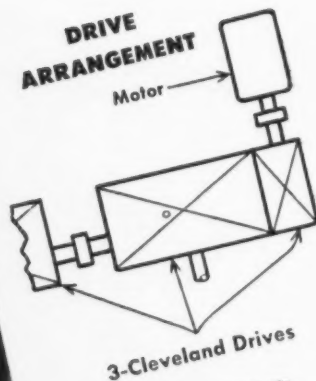
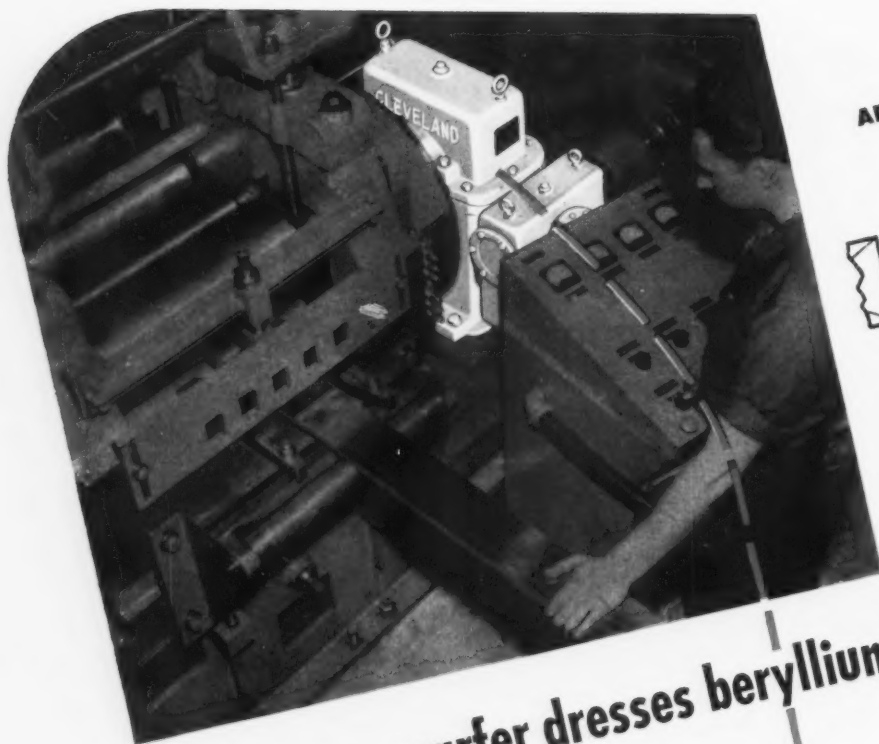
Army's Transportation Corps is experimenting with outsized rubber bags (500 gal capacity) for transporting bulk liquids. Collapsible, fabric-reinforced rubber bags turn on axles; weight 4100 lb fully loaded. Single jeep can tow six of the "rolling fluid transporters," which can also ship by rail car or barge. Bags aren't damaged by weather or fuels.

Epoxy Adhesive Meets Production Needs

Epoxy adhesives generally require special techniques, fixtures, curing cycles; are accounted poor bets for production-line use because of this, though they are known to bond strongly. A no-mix epoxy adhesive shows more promise. Shop experience shows it spreads easily out of the can, doesn't drip, cures without additives. Shelf life's upward of two years.

X-Ray Diffraction: Getting Around More

Simpler-to-use equipment is helping make X-ray diffraction more useful to production and sales, as well as research workers. It's helping shop people spot dangerously high residual stresses in sheet stock; is helping show where heat treatment will help avoid weld cracking, stamping troubles, defective shells in drawing. For sales managers, the simpler equipment will help determine why parts fail in service.



Note the small overhung reducer is transmitting power to both of the larger Clevelands—a compact but powerful drive arrangement.

CLEVELAND-driven scarfer dresses beryllium-copper slabs

Specially designed to handle beryllium-copper alloys, this automatic rotary scarfer puts smooth, clean surfaces on bar stock ranging from $\frac{5}{16}$ " to $1\frac{1}{8}$ " in thickness, up to 14" wide.

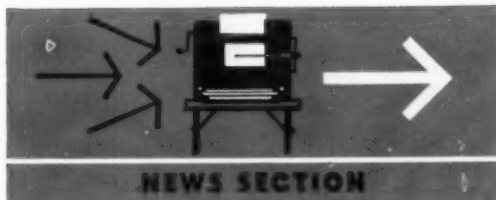
Drives are Cleveland Worm Gear Speed Reducers, actuating both the rotary tooth cutter and the bar-drawing mechanism. Power from the motor is transmitted at a uniform, predetermined rate, ensuring precision in product dimensions and economy of machine operation. Furthermore, the compactness of the right-angle Cleveland drive arrangement permits important space saving in the equipment installation.

Wherever you need to operate a machine efficiently, smoothly and economically, count on using a Cleveland. Let us send you Catalog 400 and the name of our nearest representative who is prepared to help you select Clevelands best fitted to solve your transmission needs. The Cleveland Worm & Gear Company, 3282 E. 80th St., Cleveland 4, O.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers





MARKETING: How To Pick A Consultant

Problems of marketing are too broad for many small firms . . . Make sure your consultant is equipped to perform the service . . . Here are some rules to follow to help get best results—By Eugene B. Mapel.



Eugene B. Mapel, left, is Vice President of the New York management consulting firm, Barrington Associates. Until eight years ago he was Assistant to the President and Director of Administrative Planning for the then Carnegie-Illinois Steel Corp. He is widely known for his work in long range organization and market planning.

More Than "Nose Counting"

"I have been asked in the past, 'What is the most common misconception of top management executives regarding consulting services?' My answer has always been 'the belief by many that management consulting in the marketing field consists of nose counting or the statistical tabulation of buyer responses'."

"Buyer or prospective buyer responses may be a part of an objective sales study—but usually only a small part. Interpretation against benchmarks of successful practice in other companies is usually the key to the development of a sound program of management action in the marketing field."—E. B. M.

♦ HOW BIG will your market be in the next five years? Will your sales go up, down or tread water?

Everyone knows the economy is rising at a pretty fast clip. And its no secret that the nation's buying habits are changing along with it. But how much will *your* company share in this expansion?

The answer lies in how well you run the gamut of a whole series of marketing problems. Among these are questions of products, new or old; changing buying habits; distribution channels; market area potentials; and many others.

Marketing management should be able to solve these problems, but only the larger firms can do so. Smaller companies—with limited staffs—often bog down.

Perhaps there is little a management consultant can do that could not be done by line management—if it had the time, techniques and objectivity. But often the traits which make it possible for management "to get things done" work against objective planning.

Products have to be made and sold for the present market; current problems will always demand immediate action by management. And it must always study ways to improve the manufacture and marketing of a product—and to find out what makes performance effective. This is where management consultants are most useful.

HOW TO CHOOSE A CONSULTANT

It's safe to say that today most of the better-managed American companies use management consultants frequently. Larger com-

panies are most likely to ask them to tackle unusually complex or delicate problems or to provide an unbiased viewpoint. Smaller and medium-sized companies may have them appraise and revamp a whole sales program.

But whatever the need, if you're in the market for a management consultant, there are several things you should keep in mind:

1. Make sure the firm has had experience with the *type* of problem you're faced with. This needn't be in your *particular* industry.
2. Be certain the firm is financially responsible and has a sound reputation.
3. Make sure the people who will handle your problem have mature business experience.
4. Find out how much time the partner or principal of the firm will spend on your particular assignment.
5. Ask to see the firm's code of ethics. The better ones have them and stick to them.

Above all, never employ a consultant without first making sure his business philosophy is acceptable to you. This means simply that you want to know what his beliefs are in the field of marketing, gen-

eral management or any other particular activity. Both of you might just as well start out pulling in the same direction.

As in everything else, there are pitfalls to avoid in choosing a management consultant. I dislike being negative on a positive subject but here are a few you should guard against:

1. Beware of the recommendation of a personal friend if he hasn't had first-hand experience with the firm.
2. Beware of the smooth-tongued salesman who wants an answer today because he just happens to have one or two of the best men available who can start your job "Monday morning."
3. Beware of the glowing promise. Good firms are reluctant to specify dollars and cents results until they've studied the problem and found out how much cooperation they'll get in solving it.
4. Beware of the low bidder. Good management consulting shouldn't and doesn't come cheap.

WHAT YOU CAN EXPECT FROM A CONSULTANT

Don't expect to buy from a consultant a unique or novel merchandizing gimmick which will give you a running start on your competition.

In the first place you probably

know more about merchandizing in your business than he does. Secondly, in most cases, brilliant ideas don't come from objective, detailed study. Let's face it—they are usually the result of inspiration *after* study.

If you want a consultant to evaluate alternative courses of action—on two or three merchandizing ideas—that's another matter. You'll probably find his judgment here better than yours.

One reason is that a skilled consultant operates in the belief that many a fact isn't true at all. He's learned that the best consultant is an intelligent skeptic. He knows that many "facts" accepted as true by those close to a problem are not—if you look at them closely.

But at the same time the professional consultant prefers to build up rather than tear down and replace. He has found his best opportunity for constructive help lies in improving existing practices and procedures—rather than starting an upheaval.

He also looks for strengths in people. At times he throws away the rule book and recommends changes to capitalize on the strengths of certain personnel. When he does this he doesn't build the organization structure around people. He builds a structure which will be effective for the long pull and fits people to their own—

What Marketing Managers Want To Know

Brooks Edler Photo



Eugene B. Mapel

"What kind of marketing problems are taken to management consultants?" This is not an all-inclusive list, but it does show what questions are now of greatest interest to sales management. They are—

1. Do we have enough salesmen to properly cover the market under today's conditions?
2. Is our field supervisory organization adequate in numbers and in pattern?
3. How can we find out if it would pay to open new sales territories from the standpoint of economics?
4. Should we eliminate the distributor and move the product direct to the dealer or consumer—or should we use the distributor even more.
5. Should we supplement our regular sales force with agents in fringe or marginal territories?
6. If we reduce territories for the purpose of adding new men, how do we sell the idea to the present salesmen?
7. How can we get more "pull" into our compensation plan under all kinds of business conditions?
8. Should we trend toward more specialized or general line selling?
9. How can we tell whether a new salesman is going to be successful, before spending a lot of money on a "doomed failure?"

and the company's—best interests.

Objective studies of marketing practices by skilled observers can mean many things to a company. They can:

Guide new product development to suit demand and market needs.

Assure that present products are offered to those markets with the greatest potential.

Predetermine the best product appeal; the best ways of reaching the potential buyer; the most fruitful planning of promotions; and those market areas which will bring the greatest return for the promotional dollar.

Pinpoint special market problems to make sure the company's efforts are concentrated in the direction of greatest long-pull potential.

Cut marketing expenses by reducing waste in marketing functions.

HOW TO GET THE BEST RESULTS

Assume you have chosen a management consultant experienced in marketing—and the firm operates as intelligent skeptics. The chances are your project will be doomed to failure if you just sit back and wait for the report. Here are some rules to follow to get the best results:

1. Don't object if the consultant spends a lot of time defining the

10. How can we quickly tell whether a new sales or promotional move is paying off?

11. How much money should we spend in a declining market?

12. How much money should we spend in an expanding market which will not mature for several years?

13. How do we find out whether a new product should be sold through our regular organization or through a special sales organization—and how much should we spend during the building stage?

14. Should we concentrate on a limited product line sold nationally and to all markets, or should we concentrate on limited markets with a broader product line?"

On Management Consultants

"In the business world, surface appearances are often deceptive. An apparent stroke of business genius may be due simply to the pressure of circumstances. On the other hand a grave error in business judgment may result from just as logical a process of reasoning as a more accurate one.

The consultants I know are not geniuses—and I think I know some of the best. They are just unusually gifted, ordinary, mature business men who use tried and tested methods to help you get an answer to your problem. Research must precede consultation and advice."

E.B.M.

problem. The able consultant defines the problem as thoroughly as possible before he accepts an assignment—but now he must make certain.

2. Don't hold back information to test the consultant's skill at ferreting out the unusual. You're paying for time and skill.

3. Don't add to the original assignment if you've been given a firm quotation on the time involved. You may add the straw that makes it impossible to complete the major job.

4. Don't ask for a recommendation before the deadline because you have a "hot" promotional idea you want to put to work immediately. A fully integrated and balanced program can be largely nullified by premature action.

5. Don't ask the consultant to do your dirty work. If you want to make life miserable for "George"—you do it.

6. Don't ask the consultant to make decisions. That is your job. His duty is to make an objective study and recommend a course of action. The decision must be yours.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept. THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Pay Science Scholars

Bills introduced by Sen. Pastore (D.-R. I.), and Rep. Price (D.-Ill.) would provide \$500 government scholarships for high school and college engineering and mathematical students.

Proposals would award a \$500 scholarship to every high school senior who successfully passes an examination in the "traditional fundamental subjects of mathematics."

Similar grants would also be available to college students who successfully complete a course in calculus.

Sponsors of the bills point to the threat Russia's intensive science training program poses to this country. They say the proposals would support courses basic to any higher education rather than placing undue emphasis on one area of specialization.

Another aim of the program, according to the sponsors, is to stimulate community improvement in local schools.

Armco Pipe Plant

Armco Drainage and Metal Products, Inc., will spend \$400,000 to build a new plant at Wellington, Ohio.

Products to be manufactured include corrugated metal pipe and pipe arches, paved pipe and pipe arch, large diameter smooth-flow sewer pipe and pipe fittings.

Construction is scheduled to begin as soon as the weather permits. Operations are expected to begin about July.

Part of the 30,000 sq ft of floor space will be devoted to warehousing Armco products made elsewhere, for sale in the area.

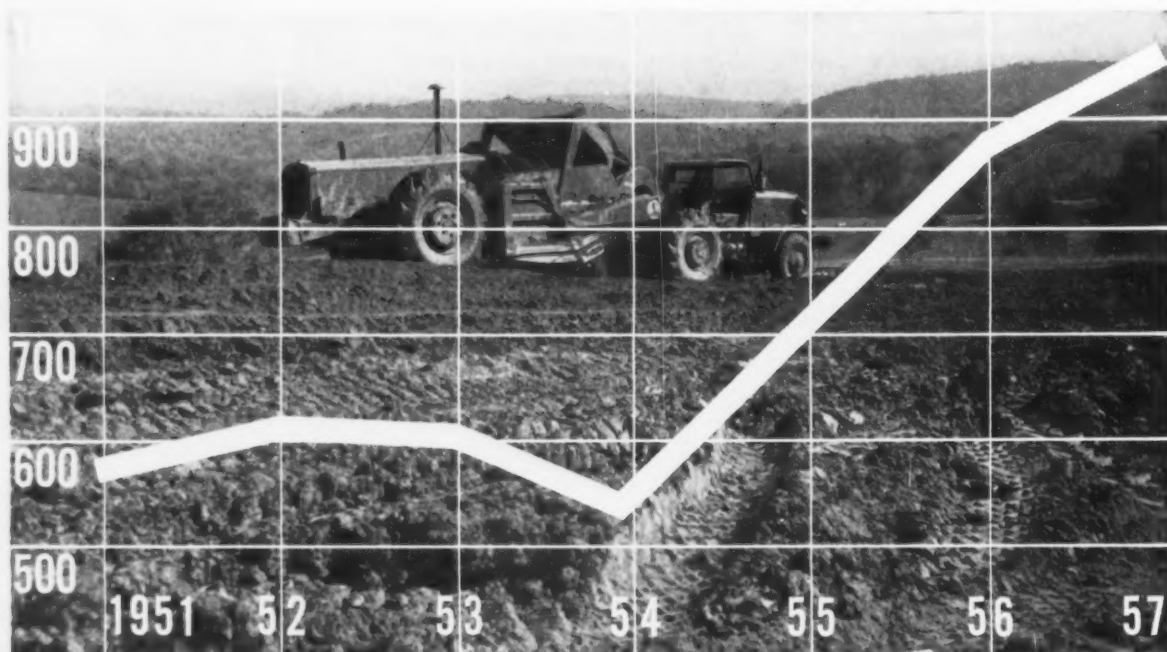
Million for Defense

United Aircraft Products, Inc., Dayton, Ohio, will spend \$1 million on a two-part expansion project aimed at doubling its capacity for production of aircraft quality sheet steel assemblies for defense industries.

The initial phase, already accomplished, is purchase of a new 90,000 sq ft plant in Forest, Ohio.

The second part, now in progress, is purchase of new machinery for welding and presswork.

It Looks Good For Road Building



Sales of Earthmoving and Excavating Equipment
(In Millions of Dollars)

1957 — Estimate

ROADBUILDING: Equipment Makers Roll

The Federal roadbuilding program, Canadian and South American market prospects have touched off an era of prosperity . . . Equipment industry boasts improved models . . . But there are danger signs.

◆ ROADBUILDERS and their suppliers are teeing off for the long-awaited \$100 billion, 41,000-mile highway program.

It's figured that highway expenditures in 1957 will hit \$5.6 billion, as compared with \$5 billion in 1955 and \$4.8 billion in 1954. Prosperity is smiling overseas as well. About 20 pct of U. S. roadbuilding and construction equipment is going into the export market.

It is figured that foreign nations spent around \$11 billion for new highways in 1955, spent nearly \$13 billion in 1956, and will spend even more in 1957. About 12 pct of 1957 U. S. new construction will be roadbuilding.

Individual sales chiefs are talking, for their own companies, of sales gains of construction equipment of anywhere from 15 to 35 pct. Backlogs vary from six weeks to six months. Deliveries are fairly current.

And U. S. roadbuilding equipment manufacturers are sitting squarely on the world's hottest market for their product. The U. S. has the biggest 1957 roadbuilding program. Canada is in the No. 2 spot. South America, although it's way down the list in actual roadbuilding mileage let in new contracts, is showing the fastest gain of any roadbuilding equipment market.

Despite this strong injection of

long-term business, there are some clouds in the construction equipment picture. Certainly not at the manufacturing end. Equipment builders are showing off new equipment, bigger equipment, and equipment that is virtually guaranteed to reduce costs.

Bigger, Better Models

LeTourneau-Westinghouse is showing a mammoth 27-yard scraper-hauler that will carry 32.5-ton of earth in a single load. Cummins Diesel has three new models, including turbocharged types. Other producers also are introducing turbocharged equipment.

Caterpillar is introducing a

four-wheel-drive, rubber tired tractor rated at 300 hp, twin diesel of 416 hp.

Lorain is showing a self-propelled, shovel-hoe-crane combination. Mack has a 43-ton, six-wheel, off-the-highway dump truck, and LeTourneau a 35-ton "Transporter" that needs no roads, operates on rubber tires with an electric motor for each wheel.

Harnischfeger is showing its 45-ton lift capacity truck crane. Euclid has a 470 hp, 40-ton, twin-engine dump truck. Dixie Dredge boasts a dredge that can dig down 22 ft, yet floats in 2 ft of water.

Bankers Are Wary

Names once familiar largely in the farm belt are becoming equally familiar in earthmoving and materials handling equipment.

John, Deere, International Harvester, Allis Chalmers, Oliver, Minneapolis-Moline, Massey-Harris-Ferguson, J. I. Case all have booming construction lines. One of the more recent entrants has a 6-month backlog of orders.

Where's the fly in the ointment?

Business must come from contractors. And contractors are reporting some problems. Hence the warning note sounded by bankers attending the Roadbuilders Show.

Said one: "In 1955 about 12.8 pct of business failures were construction firms. There were 1404 failures in that field in 1955 and 1834 in 1956. The competition is getting tougher. About 10 pct of all business firms are now in construction.

A bankers' sampling of contractor profits indicated a 5 pct return in 1947, as compared to 1.5 pct in 1956. Again, indicative of the tight competitive pace, bids on an Illinois toll highway found low running 23 pct under the high bids. Suggested one observer, "Nobody is that much better at cutting costs than his competition. Somebody is going to get burned."

Certainly equipment business is booming. But a few sage veterans are pointing to these warning flags and suggesting: 1—contractors strengthen their credit standing, 2—manufacturers hold down their finished goods inventories, 3—both groups must not overconcentrate on the highway program.

MARKETING

FURNACES: '57 Looks Good

Industrial heating men don't expect a new record . . . But there's no real pessimism this year . . . A closer look at tax picture is advocated . . . 1956 was a record year.

♦ AFTER A WHOPPING sales record in 1956, industrial heating men are still looking forward to another good year. Few figure it to better '56 which was 9 pct above '55. Some are dubious about second-half prospects. None fear a "poor" year.

A mixture of public optimism and private concern is typical of executives of some of the nation's top heating equipment companies. This was clear when they met in Washington at the annual meeting of the Industrial Heating Equipment Assn.

Fighting Talk

Since they share this private, quiet concern with many leaders of heavy industry, a solidly optimistic talk by a top-notch economist seemed in order. It came from J. M. Dawson, vice president, National City Bank of Cleveland. "You can expect pessimistic reports on some financial pages," he said. This is what to expect when business is running along on a fairly flat plateau. If everything were going up, he said, there would be trouble from top-heavy inventories by mid-year. Fortunately, he added, some caution has crept into buying which will keep things from running away.

"Every year since 1946 people have been saying, 'The first half looks solid but I'm worried about the second half.' In 8 of 11 cases the second half has been better than the first—perhaps because business was concerned about it," Mr. Dawson pointed out.

Study Depreciation

George Terborgh, research director, Machinery & Allied Products Institute, suggested a closer look at depreciation policy. Since either of the two newer deprecia-

tion methods are more realistic than the old straight line method, he urged their wider use. They usually increase the after-tax return by 10 to 15 pct, he said.

Dr. Terborgh does not look for any major changes in depreciation law this year. Some years ago, he recalled, U. S. Steel tried to show how inflation had hit its depreciation account. Steel plant replacement costs had skyrocketed; this meant that profits were overstated. However, U. S. Steel was clobbered by the SEC and the N. Y. Stock Exchange for its pains; the effort died.

Domestic orders in 1956 totalled \$108,247,000, topping the \$99,659,000 registered in 1955. This is a new all time high.

Foreign sales were also up substantially, to \$5,665,000 from \$1,439,000 in 1955.

However, all was not as well in every category. Orders received for steel mill furnaces in 1956 dropped to \$8,322,000 from \$11,443,000 in 1955. The association says the slip was probably due to the decline of December business in 1956.



W. H. HOLCROFT, new president of IHEA. C. F. Olmstead is the group's new vice-president.

GREEN RIVER: Can It Make A Comeback?

Jessop plan to reorganize Kentucky steel firm may get green light this week . . . Company hit financial shoals after promising start . . . Government loan involved . . . Jessop would push sales—By J. B. Delaney.

♦ HOW DO YOU put a sick steel company back on its feet?

Jessop Steel Co.'s Frank B. Rackley believes he has the formula. So he's getting set to take on another company in the same spot as Jessop once was. The company is Green River Steel, an electric furnace plant situated adjacent to the Ohio River near Owensboro, Ky. Green River was declared a voluntary bankrupt last year.

Jessop will learn this week whether its plan to reorganize Green River will get the green light. Federal District Judge Henry Brooks of Louisville, Ky., has indicated he will approve an amended plan submitted to the Securities & Exchange Commission. A decision is expected today (Thursday), barring unforeseen legal roadblocks.

Government Loan

Green River, built with an \$8.5 million government loan and \$4 million of private funds, poured its first heat of steel in 1953. That was a boom year in steel and the outlook seemed bright. But the bloom came off the rose a few months later, and the steel business went into a relative tailspin in 1954. Green River was never able to catch a second breath, despite a pickup in '55 and '56.

Frank Rackley and his management team at Jessop think they can put Green River back on the road to financial health. They're backing their optimism with \$1.5 million worth of new equipment to supplement the basic steelmaking and processing equipment at Green River. But Rackley feels his chief weapon will be the same people who helped him bring Jessop back from the brink during the last nine years.

Assuming that Jessop's plan for Green River goes through, Rackley

plans to emphasize sales and service. He's got a ready-made field sales force of 36 men in 15 district offices from coast-to-coast. In addition, he's built up 221 distributor outlets.

Raise Yield

In another direction, Jessop has plans to change Green River's product mix and to take it out of the conversion ingot and carbon steel business. The company's present product mix includes 2000 tons of aircraft alloys and 3000 tons of commercial alloys monthly, with the balance conversion ingots and carbon steels. Annual ingot capacity is 140,000 tons.

"It's our ambition to raise the average sales price of Green River products from the present \$140 per ton," says Rackley. "We feel we can develop for the company a price of \$320 a ton, which will mean that the company will produce medium to high specialty and alloy steels."

Rackley visualizes the combined sales of Jessop and Green River as eventually reaching \$60 million. Jessop alone last year had sales of \$25.5 million, with a net profit of \$1.5 million—highest in history—or more than \$3 per common share. Jessop has no funded debt.

Rackley has other irons in the fire, too. Green River would be the first of several deals involving acquisition and merger with other steel firms. He foresees a "little steel" combine that would generate sales of \$150 million to \$200 million annually.

The reorganization plan for Green River would involve an exchange of stock (15 shares of Green River for one share of Jessop), a Jessop loan of \$1.5 million, and a new first mortgage note of \$8.5 million to the U. S. Treasury Dept. Holders of Green River debentures would receive new debentures in the same principal amount as their present holdings.

A Look at Green River's Dornin Process

♦ GREEN RIVER was organized by Sidney D. Williams, formerly executive vice president of Copperweld Steel Co. It was the first plant to produce ingots commercially by the so-called Dornin process. This process permits production of sound ingots without hot tops, and isolation of pipe cavity and segregation zone with a minimum of cropping losses.

An appraisal by A. T. Kearney & Co. indicates, however, that the Dornin process introduces cost factors "not present in other companies." The report goes on to say that this is partially offset by higher yield from ingot to finished product.

The Kearney appraisal adds

that, to be profitable, the Dornin process "should be applied to the maximum possible extent to high priced, high profit alloy steels."

This recommendation fits in with the plans of Jessop to concentrate on producing the more expensive alloys and thus more than double the present average selling price of Green River steels.

Jessop aims at concentrating on aircraft alloys and other special alloys as contrasted with the preponderance of commercial alloys now produced. Some carbon steels will be made at the outset, but eventually carbon steels would be eliminated due to the low profit margin. Orders on the books will be filled.

EARNINGS: Strong 4th Quarter Helped

While it didn't match 1955, last year was a good one for sales and earnings . . . Brisk fourth quarter, in most cases setting records, was important factor . . . Producers maintaining their optimism.

♦ **NON-QUALIFIED OPTIMISM** is voiced by steelmakers as they review last year's sales and earnings and take a look at what's ahead.

Thanks to a strong fourth quarter, last year turned out a pretty good one. Capacity operations and full order books at year's end helped cancel out some effects of the summer strike.

The current quarter's pace is equally good, despite some off-again, on-again ordering in bar and sheet. If the mills are disturbed it doesn't reflect in their appraisals of the 1957 market.

"The year 1957 can't be otherwise than a good year for the steel industry unless we all drop dead. We expect steel production to set a record this year," states Eugene G. Grace, chairman of Bethlehem Steel Corp.

Discounting reports that the industry "was going to pot," he declares, "I have never known a period in which the industry has had as much live business on its books as it has today. If there's any inventory building on the part of steel consumers, it's only to get back to normal stocks after last summer's strike. We see no inventory building anywhere above normal, or year-ago levels."

Grace calls attention to activity at the company's shipbuilding division, where orders at year's end accounted for \$580 million of the \$1.341 billion on the company's books. "Within the next three years we will have done more than \$1 billion in shipbuilding orders," he adds.

Bethlehem had a net income of \$161.4 million in 1956 as contrasted with \$180.1 for the same period in '55. Fourth quarter '56 was a record period of \$61.7 million earned as against \$57.5 million in last three months of '55.

Steel Earnings—1956 versus 1955

COMPANY	1955 EARNINGS	1956 EARNINGS	PCT CHANGE
U. S. Steel	\$370,099,353	\$347,865,150	- 6.0
Bethlehem Steel	180,191,708	161,411,625	-10.4
Republic	86,271,491	90,406,665	+ 4.8
Jones & Laughlin	50,104,000	45,122,000	- 9.9
National	48,289,453	52,502,422	+ 8.7
Youngstown Sheet & Tube	41,701,140	43,174,587	+ 3.5
Inland	52,466,098	52,998,726	+ 1.0
Wheeling	17,296,000	17,672,000	+ 2.2
Pittsburgh	7,515,470	6,225,000	-17.2
Granite City	12,611,000	15,109,000	+19.8
Alan Wood	2,552,000	3,096,000	+21.3
Acme	6,172,000	6,723,000	+ 8.9
Armco	64,350,609	65,250,000	+13.8
Barium	655,318	6,560,000	+ 901
Copperweld	2,365,459	3,440,872	+45.5

While not quite so optimistic, Roger M. Blough, chairman of U. S. Steel Corp. feels "while there may be some moderation of pressure for deliveries, the second quarter ought to be a good one, both for U. S. Steel and for the rest of the industry."

While feeling consumers have been building up steel stocks since the strike he believes inventories are "well along toward the normal size in a number of products." "But I would point out," he adds, "that a normal inventory today might not be a normal inventory tomorrow, and steel consumers' ideas may change on inventory positions."

Blough sees plate and structural capacity and production increases in 1957 aggregating 15 to 20 pct more than in 1956.

U. S. Steel's net income for '56 was \$347.8 million, second only to the \$370 million for '55. Again the fourth quarter set a record at

\$104.5 million. This compares with \$102.5 million in 1955.

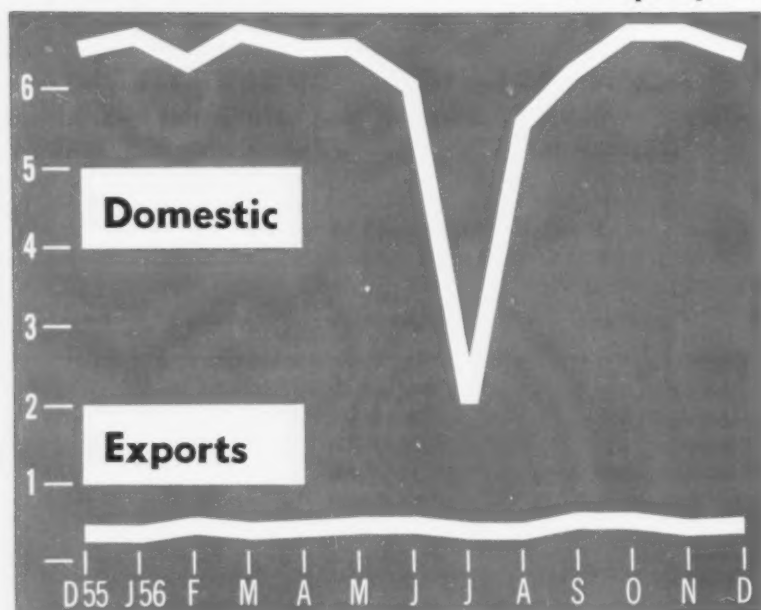
Republic Topped '55

Republic was the only one of the "Big Three" whose total earnings for the year topped those of 1955. Its net earnings for the year were \$90.4 million as compared with \$86.2 million in '55.

Jones & Laughlin reported a drop in net income to \$45.1 million last year as compared with \$50.1 million in 1955. Fourth quarter earnings were also down at \$12.8 million in '56 as against \$15.2 million in '55.

Inland established new sales and earnings, in spite of a decrease in production and shipments. Net income was \$52.9, contrasted with \$52.4 the previous year. Youngstown Sheet and Tube had net earnings of \$43.1 million which were above those of \$41.7 million for '55.

Scrap Exports Vs Domestic Consumption



In Millions of Gross Tons



Source: Institute of Scrap Iron & Steel

SCRAP: Wartime Shortage Feared

Commerce Dept. report recommends change in pattern of domestic and export consumption . . . Suggest more reliance on bundle scrap, less on obsolete heavy melting material . . . Projects export rise.

◆ THE COMMERCE Dept. says a "serious shortage" of iron and steel scrap could result in wartime unless the present pattern of domestic and export consumption is changed.

In a special report to Congress based on a study by Battelle Memorial Institute, the department suggests that domestic and foreign scrap users rely less heavily on the dwindling reservoir of obsolete heavy melting scrap and utilize the more abundant "bundle" scrap.

Unless this is done, warns Commerce:

"In the event of a sustained national emergency, when there would be dislocation of prompt industrial scrap production, when the flow of obsolete scrap would be retarded by extended usage of old equipment, and when the use of more scrap would be required to

maximize steel production, a serious shortage of iron and steel scrap would result."

Exports High

Based in part on the present level of domestic use and exports, the report projected an annual increase in exports of 5 pct, and warned that requirements for heavy melting grades in the future would begin to deplete the reservoir of heavy melting scrap.

"In light of the projected surplus 'bundle' scrap," the report said, "full utilization of the scrap resource can only be accomplished by a shift in the pattern of domestic and foreign consumption."

"Continuous reduction of the reservoir of heavy melting quality scrap would have important implications for the steel industry, particularly the nonintegrated pro-

ducers of steel products. It should also affect future plans for the expansion of electric steel.

The Commerce Dept. indicated it would talk with steel producers and the scrap industry concerning "the outlook for the mobilization supply of scrap and what measures may be feasible to maintain and strengthen the mobilization base in this area."

The Department further suggested that since the large foreign scrap users—the United Kingdom, Japan, and the European Coal and Steel Community—are planning further expansion of steel capacity, the U. S. government should begin talks with these countries and their industries concerning "measures dealing not only with the short-range problem but to long-range plans to decrease their dependence on the U. S."

Oxygen:

Linde strike bares industry reliance on oxygen.

CRIPPLING EFFECTS of the strike at Linde Air Products Co., have shown up industry's growing dependence on oxygen in manufacturing and processing.

Steel production suffered almost immediately. Scrap yards were quick to feel the effects. Metalworking generally felt the pinch in the first week of the walkout.

The strike for higher wages closed two Linde oxygen plants at Essington and Kittanning, Pa., and its apparatus plant at Tonawanda, N. Y.

U. S. Steel estimated that cutbacks in liquid oxygen deliveries threatened a 3 pct production drop at its Monogahela and Fairless mills, and a one-half of one pct drop in Chicago area operations.

Bethlehem Steel Co. admitted that the slowdown in deliveries caused "some inconvenience." Lukens Steel Co. said its oxygen supply was cut 50 pct.

Emergency Measures

One large railroad was reported actively searching for oxygen sources last week. Its fabricating and repair operations apparently were caught short by the strike.

And in scrap yards where liquid oxygen is used for burning and cutting the shortage has slowed down work.

Little help was available from other liquid oxygen producers, who had no surpluses to speak of. Demand for oxygen has been so great in recent years that the industry can barely build new plants fast enough.

Linde, for example, completed six new plants in 1956 and has more than 20 others planned. Linde is a subsidiary of Union Carbide & Carbon Corp.

Oxygen use in the U. S. is climbing steadily. The present rate of consumption is about 2¼ billion cu ft per month. Much of this consumption is due to increased steel production.

The union asked for wage increases of from 20 to 37 cents an hour. Management offered 12 cents an hour across the board.

Other local contract improvements were involved.

MANUFACTURING

PIPE: More Plastic Coated

Plastic coated steel pipe is not a major production item yet . . . But new developments in research, commercial usage foretell heavy future tonnages.

Plastic coated steel pipe is still a long way from becoming a major production item.

But on the basis of new developments, stepped-up research, and successful commercial use in special fields, the time may be approaching when it takes on the role of a significant tonnage product.

National Supply Co. is selling plastic coated drill pipe and tubing for the oil fields. Republic Steel Corp. extrudes plastic over continuous weld steel pipe for gas lines.

Battelle Memorial Institute is doing research on coatings for the American Iron & Steel Institute while Consolidated Western Steel

has developed and is testing a plastic coated electric weld pipe. This is aimed at irrigation applications. Many other projects are working.

If a low-cost sandwich of the two can be produced, it could be a product to compete with copper in the home piping field. It could also fend off some of the threatened inroads by nonferrous metals.

While a universally acceptable product has eluded researchers, special problems have been licked through the use of coated pipe. Plastic coatings were a good answer to some corrosion problems.

Another problem is price. Coated pipe is still a high priced specialty. The answer is still to be found.



PLASTIC is applied to interior of steel tubes at Ambridge plant, Spang-Chalfont Div., The National Supply Co., by series of spray lances.

WESTINGHOUSE: Strike Hurt, But Helped

Well on the way to recovery after shutdown . . . Estimate strike cost about \$500 million sales loss . . . Company reports desirable result is more competitive wage scale, improved discipline.

◆ NINE MONTHS after its strike, Westinghouse Electric Corp. feels like a man who has ripped off a piece of adhesive tape. It hurt, but one hard pull was better than slow pain.

Extent of the hurt is now revealed. Westinghouse operated at a loss of \$44.6 million in the first quarter of 1956. Billings for the entire year totaled \$1.5 billion, compared with an estimated \$2 billion in sales for this year.

Big Comeback

But Westinghouse believes its strike stand ripped away a lot of long-term ills. The company feels the settlement put wages on a competitive basis, left management free to improve methods, and climaxed a long battle to establish working discipline.

In support of this thinking, Westinghouse can point to a strong comeback since the strike. Operating without a labor stoppage since October, the company

boosted sales from \$380 million in the 2nd quarter, \$409 million in the 3rd, to \$509 million in the 4th. It wound up the year with net earnings of \$3.49 million (10¢ a share), would have made \$12 million more but for a new system of inventory evaluation (LIFO).

In the critical consumer market (27 pct of its sales), the company actually surpassed its 1955 billings. An expensive promotional push along with restored production enabled Westinghouse to crowd its way back onto dealer floors. Appliance sales topped 1955 totals in 28 of 32 product categories. Showing was better than the industry average in all but 5 of the 32.

Optimistic

Backlogs of industrial products indicate that here too the company has avoided permanent market losses. Unfilled orders for apparatus products are up 86 pct over total on Dec. 31, 1954; general

products are up 55 pct; atomic power, 213 pct. Only defense products show a drop.

Westinghouse chief Gwilym Price is confident about future earnings and sales. Barring a slump in the general economy, he sees sales of \$2 billion for the company in 1957, earnings to equal \$3.50-\$4.00 a share. He expects earnings to hit a new plateau by 1958.

Mr. Price credits the strike stand and other measures for correcting major cost bulges, the basis for his earnings optimism. Westinghouse wages had been running higher than those of competitors since World War II. And for a company the size of Westinghouse (128,000 men in manufacturing) a 1¢ wage differential adds \$3 million to the yearly payroll. He feels the current contract has largely eliminated the Westinghouse wage disadvantage.

Another point noted by Mr. Price was that Westinghouse by its contract stand had retained the right to make studies, set standards, and take other steps to promote efficiency.

Apart from the improvement in its own operations, Mr. Price feels Westinghouse will benefit from healthier conditions in the whole electric industry.

He points out that General Electric, as well as Westinghouse, has seen profit margins decline steadily since 1950. One reason has been price slashing sprees. Mr. Price looks for this situation to be corrected somewhat in the future.

Capital expenditure planned by Westinghouse is \$75 million this year, \$85 million in 1958. Most of this will go into machinery for existing installations and will show up in increased output.

Electrical Industry Has Its Problems

■ Things look good for the electrical industry in 1957. But manufacturers are not entirely out of the woods.

ONE PROBLEM: Overproduction.

U. S. manufacturers have the capacity to produce about 10 million refrigerators per year. It is estimated they can sell 4 million at the very most.

RESULT: Price slashing.

Twenty-five appliance makers have dropped out of this field

since 1953, taking some of the pressure off the market. Others have diversified to lessen dependence on this single market.

ANOTHER PROBLEM: Increasing costs.

As a result, prices of heavy equipment are due to rise 4 pct in the first half of 1957, 6 pct the second half. By 1958, prices should be 15 pct over the current level. Moreover, current orders carry escalator clauses to protect against cost increases.

Save by using specialized refractories

Many refractories problems in metal-working furnaces have been solved *economically* by the use of B&W specialized refractory castables. Each ferrous or non-ferrous furnace application requires a specific combination of properties to meet the service conditions. Whether your problem is high temperatures, abrasion and erosion, slag attack or the need for insulation, to name a few, you will find the refractory castable best suited to your requirements in B&W's line. Shown here in digest form are data on the widely used B&W refractory castables for metal-working furnaces:

B&W Refractory Castables for Metal Working Furnaces

	Temp. F	PROPERTIES	TYPICAL APPLICATIONS
B&W Kaocast	3000	High resistance to spalling and slag attack. Low volume change and negligible reheat shrinkage.	Soaking pit covers, linings of high temperature heating and forging furnaces, burner blocks, electrode linings of electric furnace roofs, linings of non-ferrous metal furnaces.
B&W Kaocrete 32	3200	High strength, exceptional refractoriness, unusual volume stability, excellent resistance to spalling.	Can be used in applications similar to those of B&W Kaocast and where higher refractoriness is required.
B&W Kaocrete D	2500	Sufficient strength and hardness to withstand abrasion, considerable physical abuse and erosion.	Aluminum melting furnaces, linings and car tops in heat treating furnaces, as well as in sections of a wide variety of furnaces that are subject to scraping by hand tools or other mechanical abuse.
B&W Kaocrete A	2600	Resists reducing atmospheres. Has good resistance to erosion, abrasion and thermal shock.	Annealing furnace bases and other applications where resistance to reducing atmospheres is essential. Also as a general purpose castable for linings in medium temperature service.
B&W Kaocrete B	2300	Has an adhesive plastic texture particularly suited for vertical or overhanging constructions. Excellent for plastering.	Patching linings and baffles and for any application where plastering rather than gunning or casting is required.
B&W Kaocrete LI	2700	High alumina content, exceptionally high strength for resistance to abrasion and erosion.	Aluminum furnace linings where high alumina content is important.
B&W Kaolite 20	2000	Offers castable's fast, low cost installation plus insulation. Has refractoriness, light weight and low heat conductivity and, in addition, will resist reducing atmospheres. Can be poured or gunned.	Aluminum melting, heating and heat-treating, annealing and forge furnaces. Also for general maintenance and patching.
B&W Kaolite 22	2200	Has the same properties as B&W Kaolite 20. Can be used for higher temperatures but not in reducing atmospheres.	

Send for your copy of B&W Bulletin R-35. It gives additional information on B&W's versatile refractory castables.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

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Flood Insurance:

**FFIA moves ahead;
policies in 90 days.**

Federal flood insurance for industrial firms and home owners is finally within sight.

In another 90 days, private insurers who'll deal with the buyers are to have policies to sell. Except for two vital, missing factors—fixed rates and money from Congress—flood damage coverage could go on sale almost at once.

Rates are the bigger problem, says Frank Meistrell, chief of the still-new Federal Flood Indemnity Administration. He wants the simplest type of rate structure that can be worked out, and he's getting help from the insurance industry in developing it.

Rates a Problem

There are no true hard-and-fast rules for setting fair charges, on a national basis, for the new cover-

age. Property losses caused by floods and high tides can run into billions of dollars per year. Yet, rates set high enough to provide for all risks could be too high for the prospective buyers.

The money question can be answered more simply. Congress can be expected to grant FFIA the \$100 million the agency wants immediately. These funds are intended to pay insurers for their services and take care of the subsidy of 40 pct per premium that the government is to supply.

FFIA is going ahead with its plans to sell the flood coverage through commercial insurers. Underwriting and loss adjustment rules are already drafted. The agency has outlined its sales promotion campaign, including educational material.

Insurers and claim adjustment groups working with the FFIA are to operate on a nonprofit basis. There's to be no loading for overhead. Expenses incidental to the

insurance business are to be borne by the insurers.

While the indemnity plans go forward, FFIA is taking added thought about the way to handle its authority to grant up to \$2.5 billion in long-range disaster loans. A top figure of \$250,000 for a single loan, the same maximum as for a single flood cover policy, is prescribed by law.

The agency hasn't yet decided whether to limit a buyer to \$250,000 in insurance and loan combined. As of now, it's possible that a plant owner who wants the maximum in insurance and loan could get \$250,000 of each.

Steel:

**New electric furnace to
double Sharon's capacity.**

Sharon Steel Corp. will spend \$6 million for a new electric furnace at its Roemer Works, Farrell, Pa. At the same time the new installation is being built, foundation will be laid for another electric furnace to be built later.

The new furnace will begin operating in January 1958. It is expected to double the present 72,000-ton electric furnace steel capacity of Sharon.

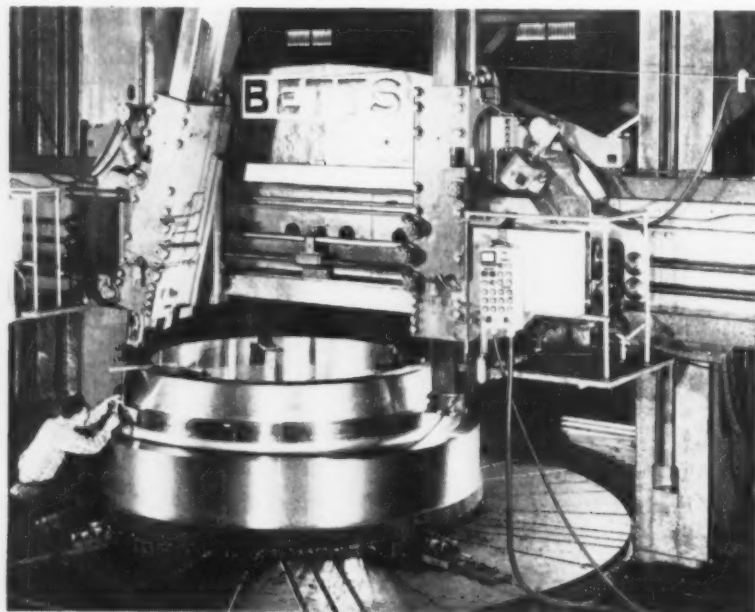
Output will be devoted entirely to metal for high alloy, stainless and other speciality steels.

Munitions Reprieve

Scheduled cutbacks in production of ammunition are being canceled on orders from Washington. The Pentagon had planned to close down some Army ordnance works and to trim production at others. But Sen. Kefauver, D., Tenn., acting as chairman of a Senate subcommittee looking into military preparedness, requested the Pentagon to hold up its cutback.

Kefauver is telling the Pentagon he fears the announced cutbacks are too severe. It was similar cutbacks just before the Korean war that caused the critical shortage of ammo during the Korean fighting, he claims.

Homestead Works Forges Ahead



MODERNIZATION program at U. S. Steel's Homestead District Works, makes possible larger, more intricate forgings, like this 35 ton flange for a nuclear power reactor, about to leave the 20 ft vertical boring mill.

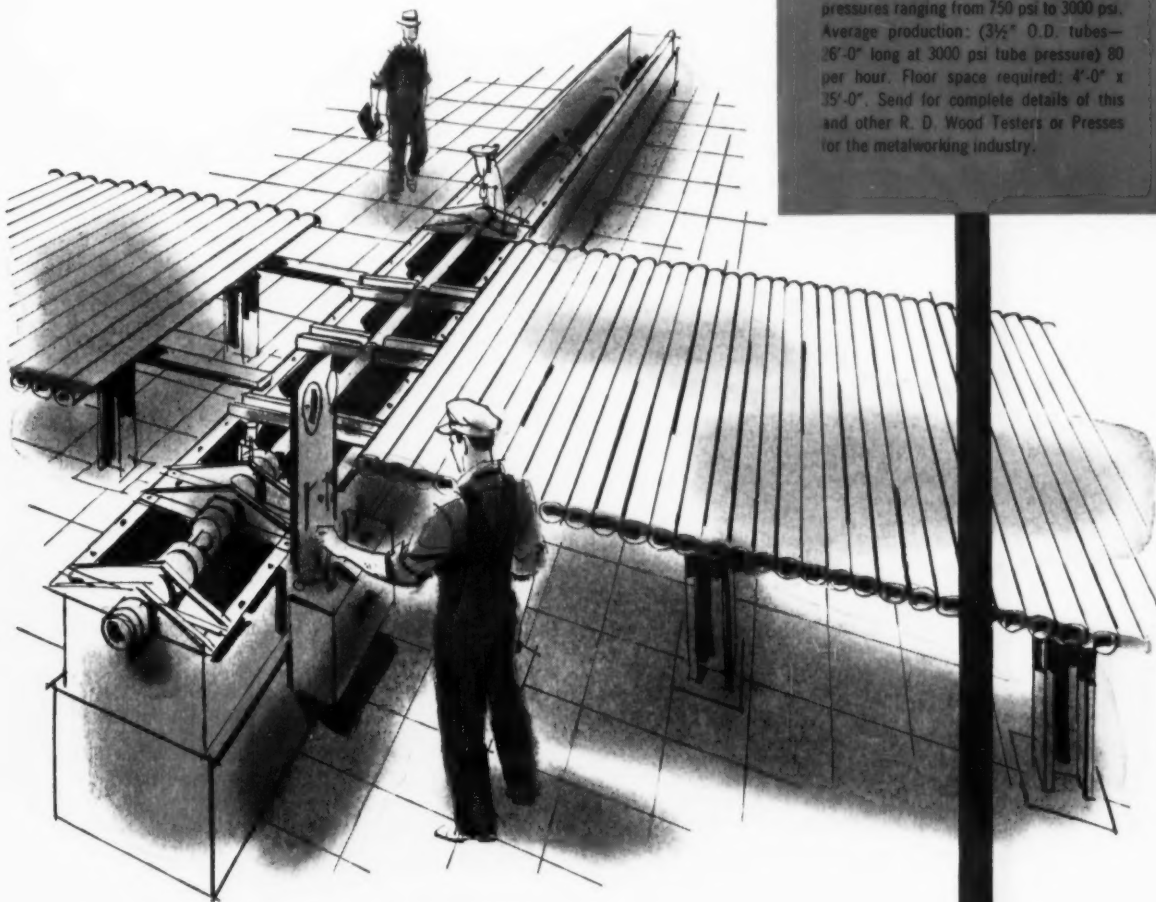
Engineered for Performance

Put a Wood Tube Tester to work and get the money-saving advantages of smooth, dependable performance . . . long operation with low maintenance.

Reason: every Wood Tube Tester is the product of sound design, carefully selected materials, conscientious craftsmanship. This is why Wood Tube Testers and Presses are known throughout industry for their trouble-free operation and fast, economical production. R. D. Wood has many standard tube tester and press designs for a great variety of uses—and engineers others for special work. Write for our catalog and engineering information. No obligation, of course.



R. D. Wood Tube Tester for hydrostatically testing tubes or pipes in sizes from 1" to 4" O.D.; lengths from 10'-0" to 26'-0"; at test pressures ranging from 750 psi to 3000 psi. Average production: (3½" O.D. tubes—26'-0" long at 3000 psi tube pressure) 80 per hour. Floor space required: 4'-0" x 35'-0". Send for complete details of this and other R. D. Wood Testers or Presses for the metalworking industry.



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HOW TO RUSTPROOF BLACK PLATE



Rust is a problem anytime, but it's particularly serious with black plate. On this light gauge, dry, uncoated steel, rust can start from a fingerprint. "Sweating" due to sharp temperature changes will cause immediate rusting on surfaces and edges.

Leading mills are now eliminating rust problems by packaging black plate in Ferro-Pak, Cromwell's volatile corrosion inhibitor paper. Chemical vapors from Ferro-Pak form an invisible film around the steel that prevents rust from getting a start, even when moisture is present.

The new Ferro-Pak sheet above was custom-made by

Cromwell's "Paper Engineers" to meet steel mill requirements for shipping black plate and dry sheet steel. It is water-proof, strong, yet highly flexible and easy to handle. Its chemical rust inhibitor is non-toxic . . . compatible with oil . . . stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write **Cromwell Paper Company, 4803 South Whipple St., Chicago 32, Illinois.**

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"Paper Engineers"



RUSTPROOFING A FREIGHT CAR. Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.

REPORT TO MANAGEMENT

It's Time To Review Your Perspective

It would be easy to be stampeded by all the current scare talk. Steel stocks, for example, took a sudden drop in recent weeks at only moderate hints of lower production. But don't let it distort your perspective.

If you take a second look at year end predictions, you'll find that they weren't way out of this world in their optimism. Actually, they were realistic appraisals. Generally, they still hold good.

In the case of steel, there is some alarm at slightly less than 100 pct operations. But no one actually predicted 100 pct operations for the year.

The most optimistic prediction of 120 million tons in 1957 is about 90 pct operating rate for the entire year. And this allows for considerable fluctuation between quarters.

A more conservative prediction of 117 million tons could make allowance for a rate of 80 pct in October. The rate for the year to produce that tonnage is 88 pct.

No Worry On Machine Tools

The latest group to pick up the crying towel is the machine tool industry. It is concerned about the decline in December orders and some eating away of backlogs.

But the long-range outlook for sales potential is favorable. Sales of machine tools are inevitably tied to the steadily rising cost of labor.

Industry today can't support itself in the face of steadily climbing wages (built into most long-term labor contracts) unless it has a continuous program of updating its machine tools. Another top year is still in the picture.

What Mr. Humphrey Really Thinks

Secretary of the Treasury George Humphrey has also been tagged as a pessimist. He actually

used the forbidden word "depression." Although, to be sure, he was looking years ahead.

But if you look at the Treasury Dept.'s estimates of tax receipts for this year, it's evident that the Treasury Dept. head expects a top business year. It would have to be to bring in the tax yield he expects.

Mr. Humphrey's plans for staying on as Secretary of the Treasury have also been subject to much debate. Close associates, however, say there is no sign whatsoever that he expects to pull out of the government in the near future.

Keep An Eye On The Weather

One of the biggest disappointments among metalworking markets has been the farmer. Sales of farm implements and equipment have failed to rebound as hoped for.

But the blame has now shifted from general economic conditions on the farm to more specific reasons. Most significant is the drought, which has plagued much of the Southwest and West for a period of years.

The head of one major implement producer says that last year all distributors in the drought area had sales moderately to substantially below the 1955 level.

Producers now say that any estimate of 1957 is entirely dependent on the weather. This is different from the talk some months ago when emphasis was on prices and purely economic factors, not geographic or natural.

The metalworking potential is still there. It's estimated that total investment per agricultural worker is \$15,000. Much of that investment is in metal products. The upward trend will continue. A little rain in the right place would help.

INDUSTRIAL BRIEFS

Plating by the Ton . . . The \$500,000 job plating plant has been completed by Adolph Plating, Inc., Chicago to serve the automotive, electronic, appliance, metal fabricating and other industrial fields. The plant features a Mechanical Plating Dept. which is capable of producing 200,000 lb of plated parts per day. The facility will handle materials on pallets moved by lift trucks. Adolph Plating itself operates seven trucks in the Chicago area in radio contact with its office.

Atoms for Sale . . . Alco Products, Inc., concluded with Humphreys and Glasgow, Ltd., of Great Britain, firm of engineer-constructors, an agreement covering the sale of small nuclear power plants overseas. The agreement covers the sale of Alco nuclear systems outside of the North American continent. Reactor system works on the pressurized-water cycle, which has been proved for over two years in the U. S. atomic submarine "Nautilus."

Atoms for Research . . . The Armour Research Foundation of Illinois Institute of Technology, Chicago, has formed a new section in reactor and nuclear systems research. It has been formed within the Foundation's Physics Research Dept. The section will engage in research in reactor concepts, reactor core configurations, reactor kinetics, shielding studies, radiation processing concepts, and irradiation facility design.

Foundry Division . . . American Brake Shoe Co. has organized a new Engineered Castings Div. to integrate five foundries and coordinate sales of their output. N. George Belury, vice president of the parent firm, has been named president of the division, which will manufacture alloyed iron and steel castings.

Loaded For Bear . . . Norris-Thermador Corp. has received government contracts totaling almost \$5 million for ordnance products. Two of the contracts, for more than \$3.5 million, extend into January, 1958. They are for the production of 90 mm steel cartridge cases for the Army. Two other contracts, received from the Navy, are for production of 8-inch brass cartridge cases and of 3-inch aluminum cartridge containers, totaling approximately \$1.4 million.

Gas Up . . . Kaiser Engineers, Oakland, Calif., has awarded a contract to The Gas Machinery Co., Industrial Furnace Div., Cleveland, O., for one 6000-CFH Inert Atmosphere Generator to be installed at the Ravenwood, W. Virginia, Works of Kaiser Aluminum & Chemical Corp.

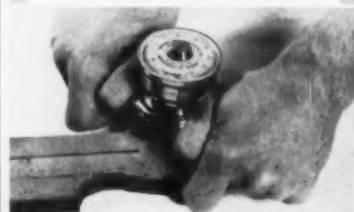
That Figures . . . The Trudeau Sanatorium, Saranac Lake, N. Y., will become a management educational and research center of the American Management Assn. The association's offer to purchase the property has been accepted by the Trudeau Foundation's board of trustees, subject to approval by the New York State courts. The newly acquired site will house seminars and courses, together with research in the science of management.

Foreign Intrigue . . . U. S. Steel Corp. has enlarged its group of steel producers licensed to manufacture and sell Cor-Ten steel, by licensing the South African Iron and Steel Corp. (ISCOR) of Pretoria, Union of South Africa, and de Wendel & Cie., S.A. of Paris, France. The addition of these two companies raises to fifteen the number of steel producers licensed by U. S. Steel to use the "Cor-Ten" trademark.

Clear the Air . . . The Sturtevant Div. of Westinghouse Electric Corp., Hyde Park, Mass., has developed an electronic air cleaner. The unit is less than half the size of standard electronic air cleaners, providing increased air handling capacity. Developed specifically to fit the needs of commercial buildings, the Precipitron R model will also bring savings of up to 35 pct over previous costs for electronically cleaned air.

Sawdust . . . A 40,000 sq ft warehouse, sales office and service shop will be erected in Shreveport by Simonds Saw and Steel Co. The branch will serve as a distribution and service center to the full line of products made by the company and its subsidiaries, Simonds Abrasive Co. and Heller Tool Co.

make hardness tests ANYWHERE



with this lightweight, portable NEWAGE tester

Test any size, shape or type of metal anywhere! Use the versatile, 30 oz., portable, precision NEWAGE tester and eliminate the time, trouble and labor of getting work to a bench tester. Just press the hand grips and get answers in 30 seconds—inside or outside the plant, office or laboratory.

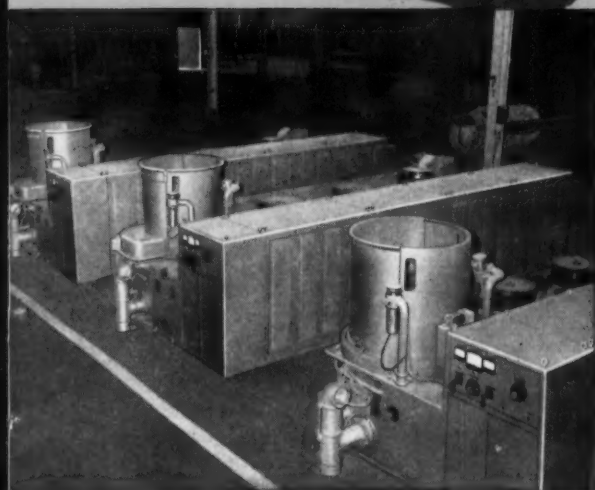
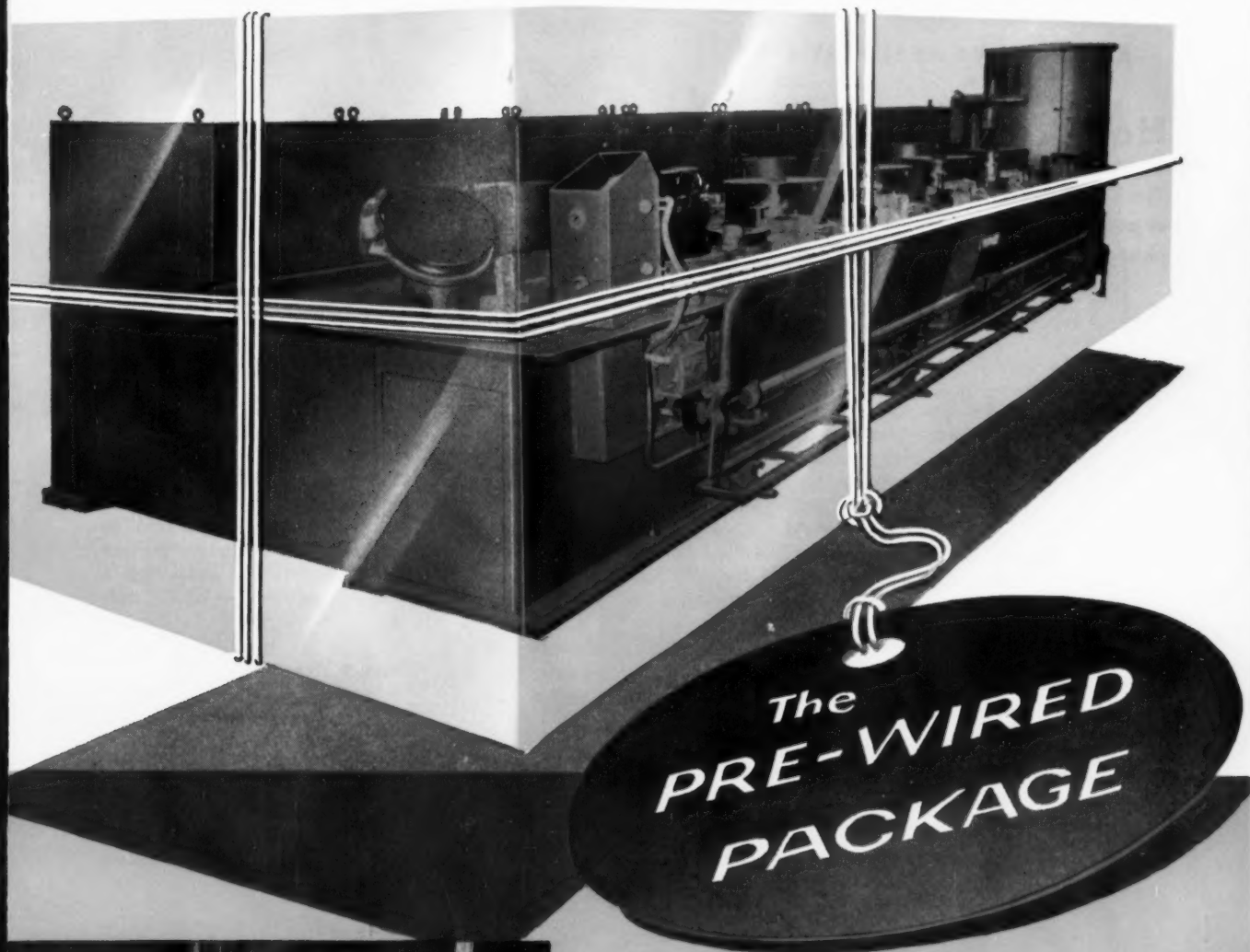
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Ferrous, Non-Ferrous Materials or their Alloys**



AUTOMOTIVE ASSEMBLY LINE

Has American Motors Passed Its Crisis?

The company says it has . . . Romney answers stockholders' charges of poor management . . . He defends AMC's diversification program and salary policy . . . Chances are good for a profit in 1957—By T. L. Carry.

♦ AMERICAN MOTORS Corp., already besieged with problems, faced up to another hurdle at its annual meeting.

A group of dissident stockholders led by Sol A. Dann, Detroit attorney, were present at the meeting to voice their dissatisfaction with management of the company.

Mr. Dann, who owns 900 shares of AMC stock, claims that the company has been badly mismanaged. He wants to know why it has been constantly losing money at the same time that top management has been increasing its own salaries.

Diversification an Issue . . . Among other things, Mr. Dann also says that one of the company's troubles is that it is not diversified enough.

The Detroit attorney is sometimes referred to as a professional stockholder. He figured prominently at last year's annual meeting of Studebaker-Packard Corp. before it became affiliated with Curtiss-Wright Corp.

Mr. Dann encouraged as many stockholders as possible to attend the AMC meeting and take some action before, as he put it, "American Motors ends up the same way as Studebaker-Packard."

AMC Replies . . . Management's answer to the Detroit attorney is that the company is well diversified right now.

In addition to its domestic automobile business, it imports the Metropolitan, which is the second best selling foreign car in the United States.

There is also the home appli-

cance business. The Kelvinator Div. has operated profitably for many, many years. Also, the company has a Special Products Div. which handles various types of defense contracts including research and development work.

However, it is a fact that the company has lost money since the merger of Nash and Hudson in 1954. Last year American Motors lost \$19 million not including a non-recurring tax loss of \$11 million.

Merger Meant Reorganizing . . . It is questionable whether or not this is due to poor management.

There were many things that had to be done immediately after the merger, that put American Motors at a competitive disadvantage in the industry.

The company had to complete

Detroit Guessing Game: Was That An Edsel?

Various automakers in the Detroit area from time to time will test a prototype of a new automobile right out in the open. The cars are usually seen on the outskirts of town. Although they are always unmarked, they stand out because the paint jobs are different from those of a finished automobile.

Just the other day we spotted three such cars which were unmistakably Edsels. This is the new line which Ford will introduce next year as a contender in the so-called medium price field.

There wasn't any doubt about

what kind of cars they were. You could tell at a glance that they belong to the Ford family.

The Edsel will resemble the Mercury more closely than any other Ford car but it is still quite distinctive.

The main part of the grille is vertical rather than horizontal. There are two other horizontal grille pieces just above the bumpers. The car also has four headlights, but it is assumed that just about every other 1958 car will also feature these.

The rear quarter panel has a scooped out area somewhat simi-

lar to the Mercury but larger and lower on the fender.

Talk around town is that Ford will have at least three and possibly four Edsel models. One will be priced between the Ford and Mercury and the rest will fall between the Mercury and Lincoln.

The Edsel Div. has raised its sights on production of the first models. Originally, the division planned to produce around 200,000 of the cars. Now it believes that it will be able to sell even more. It's also possible that production could start much sooner than was originally intended.

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what a
Harris
Press
can show
you
about
scrap metal
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BALING PRODUCTION
COSTS GO DOWN...
PROFITS GO UP!
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1018 TONS CRUSHING FORCE.
This Monster Hydraulic Press
will crush anything from gon-
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autos, down to small scrap.
CHARGING BOX—80" wide
x 72" deep x 20' 0" long.
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BETTER HANDLING... BIGGER PROFITS

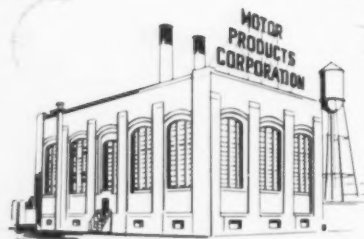
TALK WITH A MAN FROM HARRIS

HARRIS FOUNDRY
& MACHINE CO.

Reclamation Engineers Since 1889

CORDELE, GEORGIA

Ingersoll-Rand steam-driven compressor pays for itself in three years



When Motor Products Corporation modernized their main Detroit plant, they installed an Ingersoll-Rand XPV steam-driven compressor at the advice of their consulting engineers, Boddy, Benjamin and Woodhouse, Inc. This modern compressor improved plant steam balance by utilizing available steam.

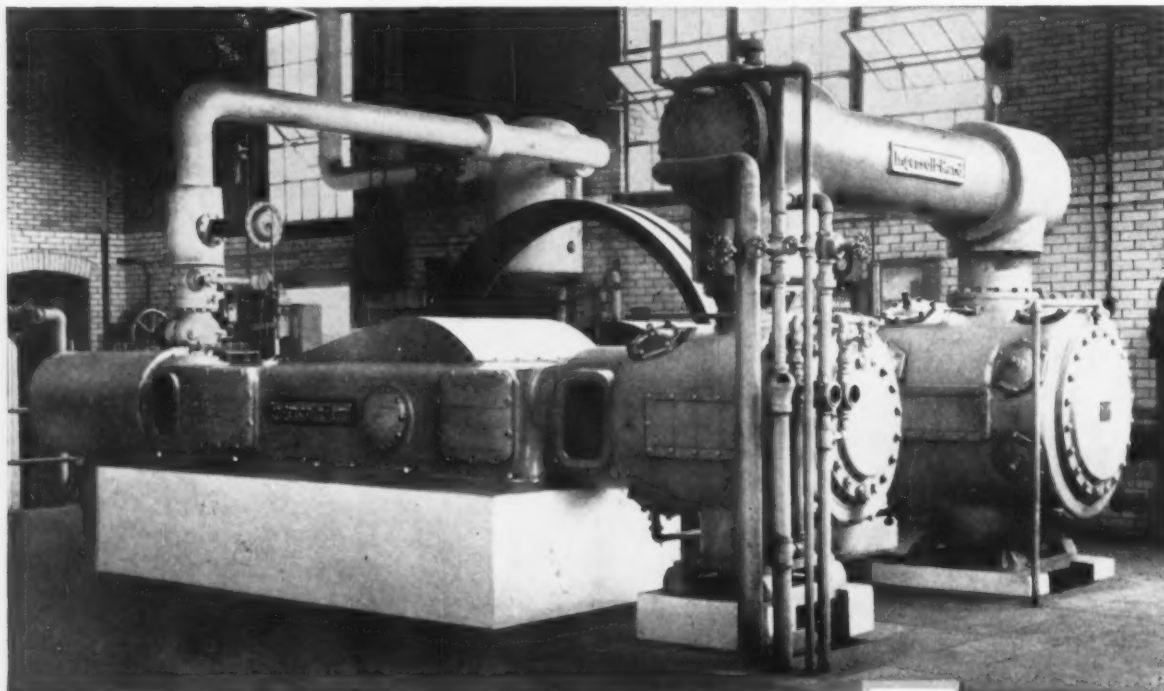
The exhaust steam from the compressors is used for building heating and feedwater heating. At full load, this compressor saves \$26,000 a year in power costs over the old electric-driven unit it replaced.

This saving will repay the original cost of the compressor in only three years.

Not every compressor can save this much in a single installation, but by careful selection, application and control, Ingersoll-Rand compressors can be adapted to give the utmost economy under any given set of conditions. Your I-R representative will help you find the compressor and conditions that give the most air power for your investment.

Ingersoll-Rand steam-driven compressors are available in sizes from 10 to 2500 horsepower. Other types are available in sizes from $\frac{1}{2}$ to 6000 horsepower, pressures to 35,000 psi and vacuums. All units are built to the exacting Ingersoll-Rand standards of durability and economy of operation.

This 1950 cfm XPV steam-driven compressor furnishes 100-psi air at the Motor Products Corporation plant in Detroit, Michigan.



Ingersoll-Rand
1-441 11 Broadway, New York 4, N. Y.



COMPRESSORS • CONDENSERS • AIR & ELECTRIC TOOLS • PUMPS • ROCK DRILLS • GAS & DIESEL ENGINES

Automotive Production

WEEK ENDING	CARS	TRUCKS
Feb. 2, 1957	146,897	23,151
Jan. 26, 1957	145,191	23,138
Feb. 4, 1956	140,582	26,690
Jan. 28, 1956	135,586	26,502
TO DATE 1957	676,108	99,849
TO DATE 1956	696,181	121,558

*Estimated. Source: Ward's Reports

the job of consolidating the organization and physical facilities of Nash and Hudson. Manufacturing operations had to be integrated; a common tooling program comparable to that of the Big Three had to be organized. Most important, the company embarked on a program of decentralization.

The result was that for the first 2 years the company introduced its new cars later than its competitors. It was naturally at a disadvantage because of this time factor.

Salary Charge Denied . . . However, George Romney, AMC president, claims that all of these problems are now behind the company. He says that it would have shown a profit for the first quarter of its 1957 fiscal year if it had not been for a supplier's strike which lasted for 2 weeks.

As for the claim that salaries have been increased, management claims that this is just not so. As proof, it cites conditions under the late George Mason when he was president of Nash. Mr. Mason had 12 top executives on his team in 1953. When the merger came off 2 years ago, the number was increased to 18.

The company claims that salaries for these 18 men were \$54,000 less in 1956 than they were for the original 12 under Mr. Mason in 1953. In addition, it is also claimed that none of the top officers of the company have received any bonuses for the last three years.

Veteran observers in Detroit believe that American Motors eventually will weather the storms it faces both from competition and stockholders.

The company continues to increase its position in the compact

car field. It has just recently set up a full-time marketing organization to handle the increasing sales of the Metropolitan. Chances are that sometime during this year American Motors is going to make a profit.

Ford's 1957 Plans

Ford Motor Co. will spend \$70 million less for tooling and expansion in 1957 than it did in 1956, but the total is still an impressive \$710 million.

This year's outlay is earmarked largely for added capacity to meet demand for the new Edsel and other Ford Motor Co. lines. Work will begin this month on a huge new Ford Div. assembly plant at Lorain, O. to be completed in 1958.

At least 10 other installations are due for completion this year in various parts of the country.

Car Bootlegging Hit

Harlow H. Curtice, General Motors Corp. president, warned the National Automobile Dealers Assn. at its annual convention in San Francisco that car bootlegging this year may be even greater than it was in 1956.

Mr. Curtice told dealers who are

Automotive News

tempted to bootleg to stop and consider before they engage in such a practice. The GM president warns that the present franchise system would fall apart if all dealers became bootleggers.

The present franchise system, Mr. Curtice says, is the best method known for distributing cars and trucks. It represents recent changes made by General Motors and other automakers to eliminate some of the admitted abuses which dealers were suffering.

The GM system, according to Mr. Curtice, serves the industry, the dealer and the customer to the best advantage.

The GM president has called upon every dealer in the country to do his best to preserve the present system. It is aimed at eliminating both bootlegging and unethical advertising.

These practices can be adequately cured by the industry itself without the necessity of government legislation, Mr. Curtice adds.

THE BULL OF THE WOODS

By J. R. Williams





Roebling
Royal Blue Wire Rope
will take shock
after shock after shock!

This, and the fact that Royal Blue is stronger than the strongest you have been using, has helped to make it the most widely favored rope in Roebling's history. It will work hard and last longer on *your* job. Your distributor or Roebling Sales Office will give you full information, or write: John A. Roebling's Sons Corporation, Trenton 2, New Jersey.



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Look For More Anti-Trust Action

**Justice Dept. will speed up drive against monopoly trends . . .
Government is genuinely concerned over small business . . . It's also good
politics . . . New look at foreign aid—By G. H. Baker.**

♦ **MORE AND MORE**, 1957 is shaping up as a year of jet-propelled government drives against monopoly trends. The Justice Dept.'s antitrust lawyers are compiling a lengthy list of industries—and companies—that will be inspected for possible violations of the antitrust laws.

Copper and nickel are two industries on the Justice Department list of industries to be examined.

Worried About Small Business . . . Why all this antitrust fuss at this particular time? Chief reason is that there's genuine concern, both within the Congress and within the Eisenhower Administration, over the declining fortunes of many smaller firms. Another reason: Antimonopoly campaigns are perennial favorites of politicians.

Here's the basic reason for the new concern over the slow drift to fewer and bigger firms: Large companies are enjoying boom times, and have been for several years. But a few small firms have not been sharing in this prosperity. Many have closed their doors. Others have been forced to sell out to competitors because of lack of cash.

Watch That Merger . . . At the Justice Department, antitrust lawyers are taking a close look at some recent mergers and also at some rumored mergers which have not yet been consummated. The upshot of this close look could be a batch of court actions against the parties involved in mergers or planned mergers. Part of the

"new look" in federal antitrust prosecution is to lock the stable door *BEFORE* the horse is stolen, not afterward. In other words, they plan to head off some anticipated mergers now.

Fact that the copper and nickel industries are being scrutinized for possible violations of the federal anti-monopoly laws doesn't necessarily mean that the government has an air-tight case against either of these industries. At this point, all it means is that the antitrust lawyers are snooping.

Loans or Handouts?

There's a growing belief within Congress that now is the time to start converting U. S. foreign aid from handouts to loans.

Within the House Foreign Af-

fairs Committee, for example, there is strong sentiment for realigning the base of the U. S. overseas aid program. Many congressmen believe that the initiative should rest with the recipients of help, not with the U. S.

This does not mean that there is any overpowering attitude within the new Congress for ending foreign aid.

What Congress has in mind in the way of new foreign aid laws for 1957 is simply this:

"The U. S. is going to have to support much of the free world for a long time to come.

"Therefore, let us now re-align our foreign aid program so as to make sure U. S. taxpayers are getting the most for their foreign aid dollars."

How To Get War Insurance Abroad

American firms will be able soon to get war risk insurance on their plant and equipment abroad.

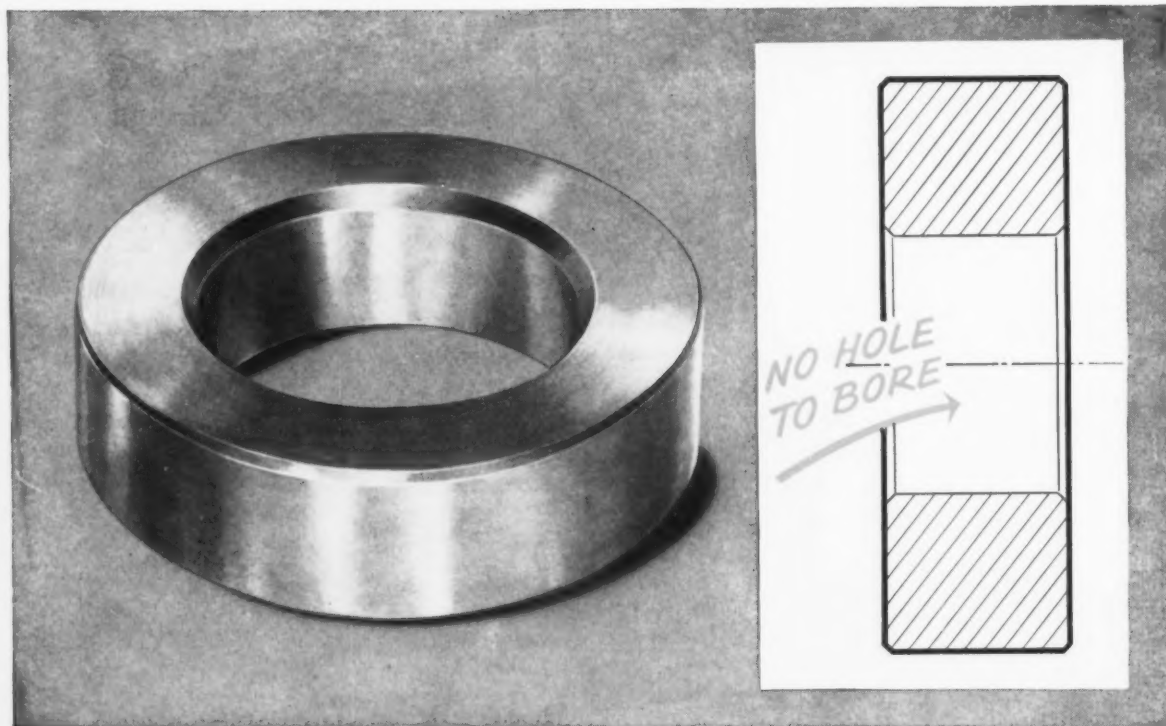
New guarantees will protect owners against losses caused by enemy action. There will be no coverage, though, in cases where property is destroyed or damaged during a revolt, a rebellion, or civil war.

The U. S. and foreign nations have discussed the agreements needed to put the new plan into effect. As soon as the agreements become firm, war damage insurance can be bought through the

International Cooperation Administration (ICA).

This agency is running two other programs to aid U. S. investors abroad. One protects against property seizure by the host government and the other against obstacles to conversion of foreign money into U. S. dollars.

Under the war risk plan, the owner can get an ICA guaranty of up to 90 pct of the value of the property he owns. But he may co-insure for more than the required 10 pct if he wishes, thus reducing the government share.



Steps up gear blank production 300% by switching from bar stock to TIMKEN® steel tubing

An engine manufacturer felt that his gear blanks were costing him too much to make. The center hole had to be bored out of solid bar stock. It took a whole hour to turn out 29 blanks. And a lot of steel was wasted in the process.

So the manufacturer discussed his problem with metallurgists of the Timken Company, experts in fine alloy steel. After study they recommended a change in production methods together with a switch to Timken® seamless steel tubing in place of bar stock.

With Timken seamless steel tubing, the center hole is already there. It doesn't have to be bored out. Finish

boring was the engine maker's first production step. And with Timken steel tubing his gear blanks are now being turned out at 120 to 130 an hour—an increase of 300%.

Machining costs have been cut by more than half. And because the center hole is "built-in", no steel is wasted.

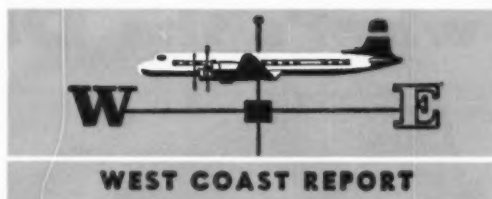
The files of the Timken Company contain records of hundreds of problems that have been solved by Timken fine alloy steel. If you have a tough steel problem, why not bring it to us? Wire, write or phone The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



TIMKEN
TRADE MARK U.S. PAT. OFF.
Fine Alloy
STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



ALUMINUM DOME AUDITORIUM, erected at Hawaiian Village Hotel in Honolulu, contains 575 panels which were fitted together like a giant jigsaw in a matter

of hours. Requiring no interior framework or support, the auditorium seats 1800 people. Designers and fabricators are Kaiser Aluminum and Chemical Corp.

Bauxite Deposits Are Hawaiian Lure

While low-grade, their potential alumina tonnage could run into the hundreds of millions . . . Might free U. S. from dependence on foreign sources . . . Reynolds, Kaiser are interested—By R. R. Kay.

◆ **EXCITEMENT** over bauxite deposits in the Hawaiian Islands is high. Both Islanders and Mainlanders are interested. Rumors are running wild about fantastic offers made for bauxite properties. Is it hullabaloo or the real thing?

Close-up View . . . An on-the-spot check of deposits on three of the Hawaiian Islands reveals they're low-grade. But the alumina tonnage could be very great, running into the hundreds of millions. Right now, there's active exploration on 330 sq mi.

"This alumina, if economically separated, would be of very high quality." That's what Dr. G. Don-

ald Sherman, University of Hawaii geologist, told THE IRON AGE.

The Hunt is On . . . He believes these deposits, if commercially developed, are so large that they "would make the U. S. independent of foreign sources." With world peace edgy, this is vital.

Right now the fever is high on the island of Kauai, westernmost of the group. Kaiser Aluminum & Chemical Corp. and Oregon Bauxite Co. are actively exploring deposits there. Reynolds Metals has been on several of the islands since August 1955.

One large Hawaiian sugar company has opened four of its plan-

tations to bauxite exploration on the islands of Kauai and Hawaii. It's said that Kaiser Aluminum holds the license—a non-exclusive "hunting license," not a mining grant.

Governmental Go-Ahead? . . . There are large deposits on Territory-owned land, too. All potential bauxite mining companies got good news recently. Hawaii's attorney-general ruled it "can sell mineral and mining rights in land owned by the Territory in fee simple." However, much legal rigmarole is still involved before companies can start mining government land.

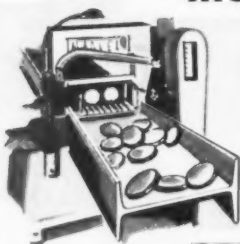
what's the **DIFFERENCE...**



the **DIFFERENCE** is...

HIGHER PRODUCTION

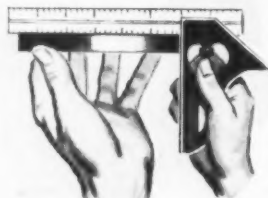
To you, the user or buyer, the most important difference between MARVEL High-Speed-Edge Hack Saw Blades and ordinary blades is the *unequalled* performance you get from MARVEL Blades.



Unbreakable MARVEL High-Speed-Edge Blades can be worked faster and harder than any other blade with complete safety. They will withstand the highest speeds and heaviest feeds attainable on any make hack sawing machine. MARVEL Blades will cut any machineable metal. No wasted time changing blades for different materials.

GREATER ACCURACY

Performance reflected in higher production (faster cutting-off), greater accuracy of cut-off blanks, and longer blade life has made MARVEL the preferred blade in every kind of metal sawing operation.

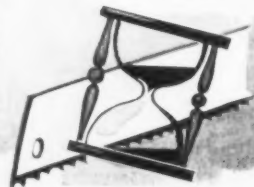


Composite construction permits MARVEL Blades to be tensioned from 200% to 300% more taut than ordinary blades. This produces greater rigidity of the high-speed-steel cutting edge, resulting in maximum obtainable accuracy of cut-off blanks.

To get the *difference* in performance, always insist on MARVEL High-Speed-Edge Hack Saw Blades. Leading Industrial Distributors have them in stock.

Write for "The MARVEL Story." It has complete details on MARVEL High-Speed-Edge Hack Saw Blades and Hole Saws.

LONGER BLADE LIFE



Each MARVEL High-Speed-Edge Hack Saw Blade is triple tempered to assure maximum toughness of the cutting edge. MARVEL Blades not only give you longer life, they assure a more efficient cutting life, with resulting lower blade costs.

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B-1121



MACHINE TOOL HIGH SPOTS

Service Manuals Need Improving

National Machine Tool Builders Assn. compares service literature among its members . . . Some are doing a good job, others leave a lot to be desired . . . Customers appreciate clarity—By E. J. Egan, Jr.

♦ **CHECK BACK** to the last time you took delivery of a new machine tool. Did an operator's handbook, a service manual and a parts-repair list come with it? If so, was it practical, readable material? Or did it lack something, like so many of the toy-assembly instruction sheets that overwrought fathers struggle with on Christmas Eve?

More and more machine tool builders are trying to produce the kind of operating and repair instructions that create customer goodwill. They're even competing with one another to see who can do the best job.

Difference In Downtime . . . In fact, the sole purpose of the National Machine Tool Builders Assn.'s 1956 Advertising Competition was to judge and honor the best service literature.

Most of the judges were buyers of metalworking machinery. They know the production crisis that usually accompanies a machine breakdown. They also know that a good trouble-shooting manual, or the lack of one, is often the difference between a few hours or a few days of downtime.

Any user of machine tools prefers to have his own maintenance men equipped with the right information, tools and parts to do a good, quick repair job. The alternative, yelling for help from a factory serviceman, is expensive medicine for everyone involved.

Give 'Em All the Facts . . . After looking over the contest entries, the judges found some praiseworthy material. They also

offered some suggestions to builders.

As typical customers, they want and need all the information they can get about installation, set-up, operation, maintenance and repair of the machines they buy.

And they do mean *all* the information. Brevity has its place, but that place is not in service literature aimed at being most helpful.

The judges also suggested that service manuals should be indexed or classified in some way.

Another recommendation pointed out the customer's need for complete details on electrical and hydraulic sequences. Including the maker's name and number for all parts is a must.

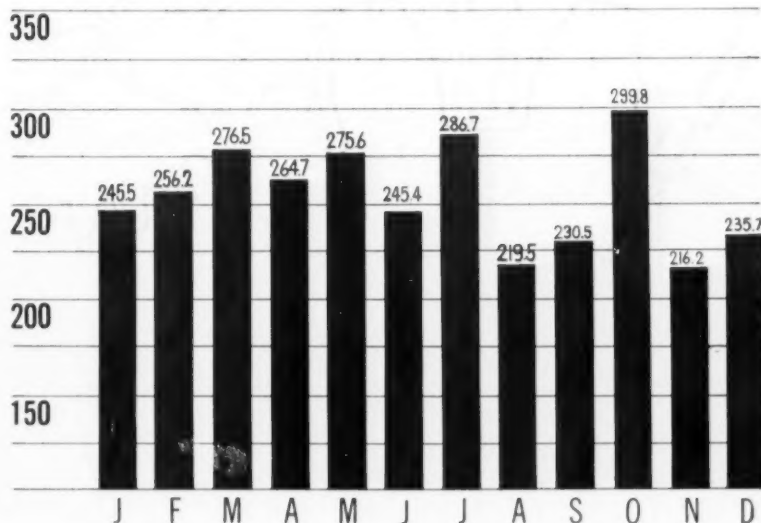
Exploded Views Best . . . Actually, the name of the maker and the proper number should be listed for every standard purchased part used in or on the whole machine. By keeping a supply of such parts on hand, the customer could save even more valuable time.

In the opinion of the judges, exploded-view drawings in machine tool manuals are more helpful than engineering drawings. In larger plants, particularly, many maintenance and repair personnel cannot read engineering drawings efficiently. Where it is not practical to furnish exploded views, complete and readable sectional views are next best.

Source: American Gear Manufacturers Assn.

GEAR INDEX 1956

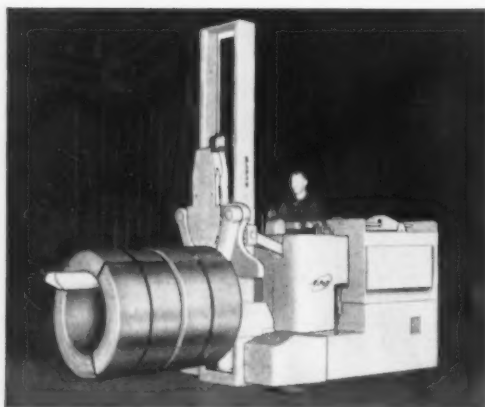
Base 1947-49 = 100



This split ram truck has a total capacity of 16,000 pounds. Each ram can handle an 8,000-pound coil. Maximum spread of rams is 42", center to center. Rams are specially contoured to support coils without damage either individually or as a unit.



Handles TWO for the cost of ONE



Truck with rams together handling coils in the conventional manner.

In a few seconds, the hydraulically-operated rams on this versatile ELPAR truck can be spread to handle two coils abreast . . . or brought together for single-ram truck operation. Therefore, you get *double-duty* performance—*double-fast* handling of different-size coils. Coil movement keeps pace with mill machinery . . . storage is faster . . . operating costs are reduced.

Available in a range of capacities, ELPAR split ram trucks are another result of Elwell-Parker's 50 years' experience in originating trucks and attachments to reduce steel handling costs. Like all ELPAR trucks, they are built to give dependable service year after year.

LEARN how you can save with ELPAR split ram trucks . . . write today.

THE ELWELL-PARKER ELECTRIC CO.
4294 St. Clair Avenue Cleveland 3, Ohio



The Iron Age

SALUTES

Emil H. Lang

President of Erie Forge and Steel Corp., during 55 years in the forging business he helped bring about many process changes; saw steel replace scrap iron. He is an outstanding civic leader in Erie, Pa.

Emil H. Lang started working at Erie Forge Co. in 1902, when steel was still an untried forging material. In those days, slabs and billets for forging were made from railroad scrap iron.

The scrap was piled neatly on boards and dumped into a furnace, boards and all. The resulting red-hot mass was then lifted out of the furnace and hammered into shape.

Mr. Lang saw many forgings go out into the industrial world that were made in this way. "These products worked very satisfactorily and served the purpose for which they were intended for many years," he says.

He recalls one particular part, a 28 in. diam propeller shaft for a Great Lakes side-paddle steamer, that broke in half after 20 years' service. Still discernible in the fracture were fused nuts, bolts, washers and other ingredients of the original scrap melt.

Metallurgy, forging techniques, Erie Forge Co. and Mr. Lang have come a long way since those days. Steel now is the predominant ferrous medium. Non-destructive testing methods can detect flaws in metal parts. Erie Forge Co. has become Erie Forge and Steel Corp., and Mr. Lang has become its president.

Spearheading an expansion program that is increasing the company's output and versatility, Mr. Lang puts the emphasis on research and development. "The idea is to produce better parts calculated to serve the purpose for which they are designed," he explains.

In the push for product improvement, Mr. Lang isn't overlooking the sales end of the business. At one interval, from 1930 to 1946, he was the firm's general sales manager.

In Erie, Pa., he is a leader in civic affairs; was named general chairman of a \$3 million drive for Hamot Hospital, and is active in United Fund work and cultural projects.



Again, the Inauguration is Commemorated
IN BEAUTIFUL BRONZE

Just as it was four years ago, the official 1957 Inaugural Medal is to be a product of private enterprise. As a result of the great demand for these pieces in 1953, over 20,000 bronze replicas are being prepared by the Medallic Art Company of New York City.

Of special interest is the fact that the portraits of both the President and Vice President will appear on the face of the medal. This is only the second time in the history

of Inaugural Medals that two portraits have been shown.

For this historic memento, a special bronze alloy, precisely formulated to exacting specifications, is now being produced in the mills here at Bristol. If you would like to own one of these handsome medals, reproduced from models by the distinguished American sculptor, Walker Hancock, send your check for \$3.50 to the Inaugural Committee, 1022 15th Street, N.W., Washington 5, D. C.



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L. C. Milheim, elected vice president, treasurer and secretary, **Treadwell Engineering Co.**, Easton, Pa.; **H. J. Leaver**, elected vice president, production.

Alphe G. Jarreau, elected vice president, **The Barden Corp.**, Danbury, Conn.

William T. Ylvisaker, elected vice president and general manager, Commercial Div., **Pheoll Manufacturing Co.**, Chicago.

Ernest Payne, elected vice president, research and marketing, **Central Screw Co.**, Chicago.

G. A. Godwin and **Edward L. Nung**, elected vice presidents, **P. R. Mallory & Co. Inc.**, Indianapolis, Ind.

Byron W. Cain, appointed asst. comptroller, **The Youngstown Sheet and Tube Co.**, Youngstown, O.

Robert H. Pohl, named director, sales, Pigments Dept., **E. I. duPont de Nemours & Co., Inc.**, Wilmington, Del.

Oswald Tower, Jr., named asst. to president, **Michigan Seamless Tube Co.**, South Lyon, Mich.

Raymond R. Dirksen, named asst. sales manager, Dynamatic Div., **Eaton Manufacturing Co.**, Kenosha, Wis.

William J. Martin, appointed district manager, Cleveland-Columbus-Pittsburgh area, **Michigan Abrasive Co.**

Harold E. Young, elected controller, **Federal Pacific Electric Co.**, Newark, N. J.

John M. Patterson, named asst. sales manager, **The Beryllium Corp.**, Reading, Pa.

E. F. Helminiak, named sales engineer, **Electro Metallurgical Co.**, Div. of Union Carbide and Carbon Corp.

Tyrone Gillespie, named coordinator, overseas activities, **The Dow Chemical Co.**, Midland, Mich.

William E. Burns, named sales and engineering representative, southern Calif., **Michigan Tool Co.**, Detroit.

John Woodward, named manager, marketing, General Plate Div., **Metals & Controls Corp.**, Attleboro, Mass.

Paul J. Barliak, named asst. superintendent, No. 1 Tin Mill Cold Reduction Dept., Indiana Harbor Works, **The Youngstown Sheet & Tube Co.**, E. Chicago, Ind.



JOHN H. MORAVA, elected president, U. S. Steel Supply Div., U. S. Steel Corp.



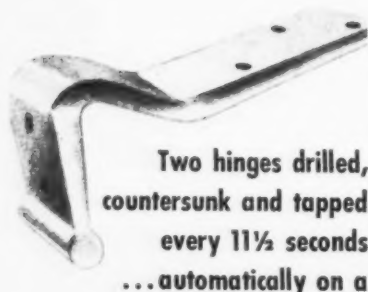
VINCENT D. PERRY, elected vice president, **The Anaconda Co.**, New York.



WILLIAM HAGEL, elected vice president, operations, **United Engineering and Foundry Co.**, Pittsburgh, Pa.

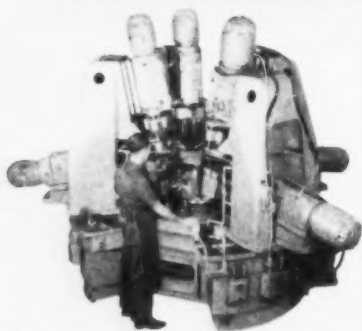


EDWIN G. CLARKE, elected vice president, European operations, **Acheson Industries, Inc.**, New York.

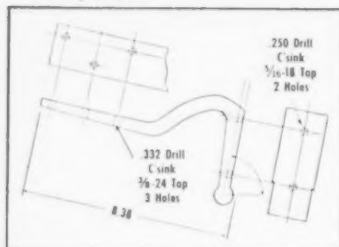


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INDEXING AUTOMATICS
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Following appointments are within the Technical Services Div., Research and Development Dept., Jones & Laughlin Steel Corp. Dr. H. N. Lander, appointed supervisor, process development; Dr. A. W. Gessner, appointed development engineer, process development section; Dr. W. H. Jukkola, appointed senior development engineer, chemical services; William F. Smith, named asst. chief chemist, Aliquippa Works.

John L. Carmichael, named special sales representative, cold-finished bars, Jones & Laughlin Steel Warehouse Div., Indianapolis.

J. R. Hursh, named chief products engineer, Engineering Dept., Armco Drainage & Metal Products, Inc., Middletown, O.

William W. Deal, named asst. to manager, sales, western area, American Steel & Wire Div., U. S. Steel Corp.

E. V. Schulte, named asst. manager, development section, Engineering & Construction Div., Koppers Co., Inc., Pittsburgh.

Alexander Alexander, named finishing engineer, Chicago area, Hanson-Van Winkle-Munning Co., Matawan, N. J.

H. H. Brandt, appointed New York district sales representative, Laclede-Christy Div., H. K. Porter Co., Inc., St. Louis.

F. W. Dorenbos, named asst. chief engineer, Clearing Machine Corp., Div. of U. S. Industries, Inc., Chicago.

William J. Weber, named manager, Market Research Div., AMP Incorporated, Harrisburg, Pa.

Donald L. Mosher, named plant superintendent, Vitro Rare Metals Co., Canonsburg, Pa.

E. F. Coy, appointed director, sales, Mechanical Div., General Mills, Inc., Minneapolis, Minn.

PERSONNEL



REAR ADM. WILLIAM O. GALLERY, elected vice president, administration, Verson Allsteel Press Co.



MELVIN D. VERNON, elected vice president, marketing, Verson Allsteel Press Co.



J. W. HOLTON, named regional coordinator, Armco International Corp., Middletown, O.



SAMUEL M. PARKS, named manager, Pittsburgh district sales, American Steel & Wire Div., U. S. Steel Corp.

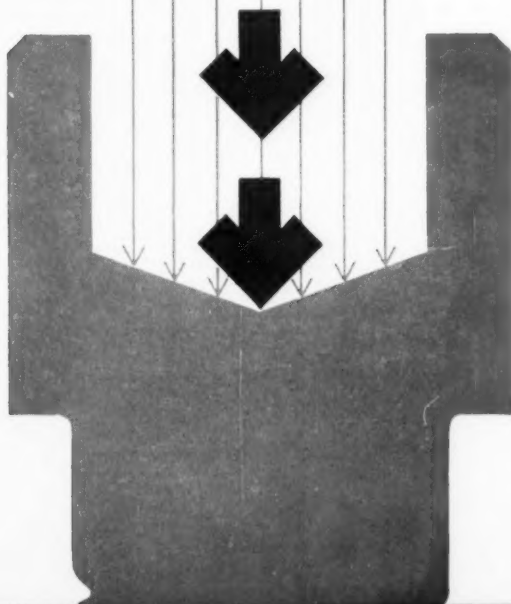


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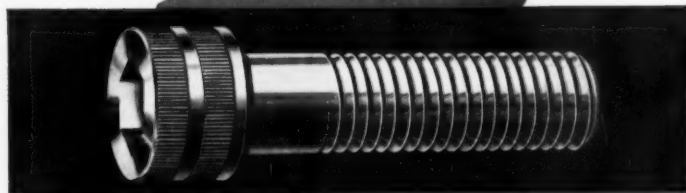
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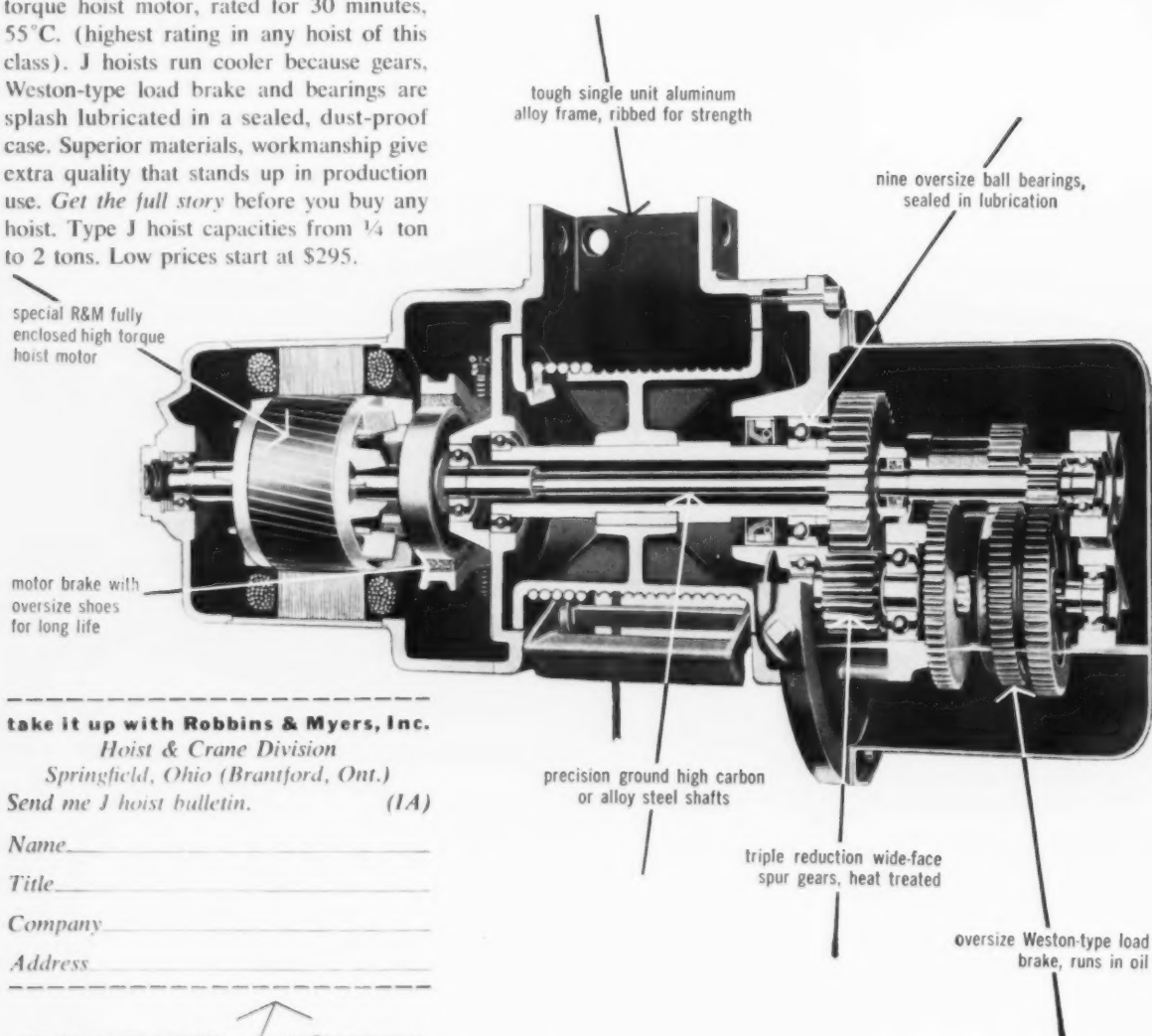
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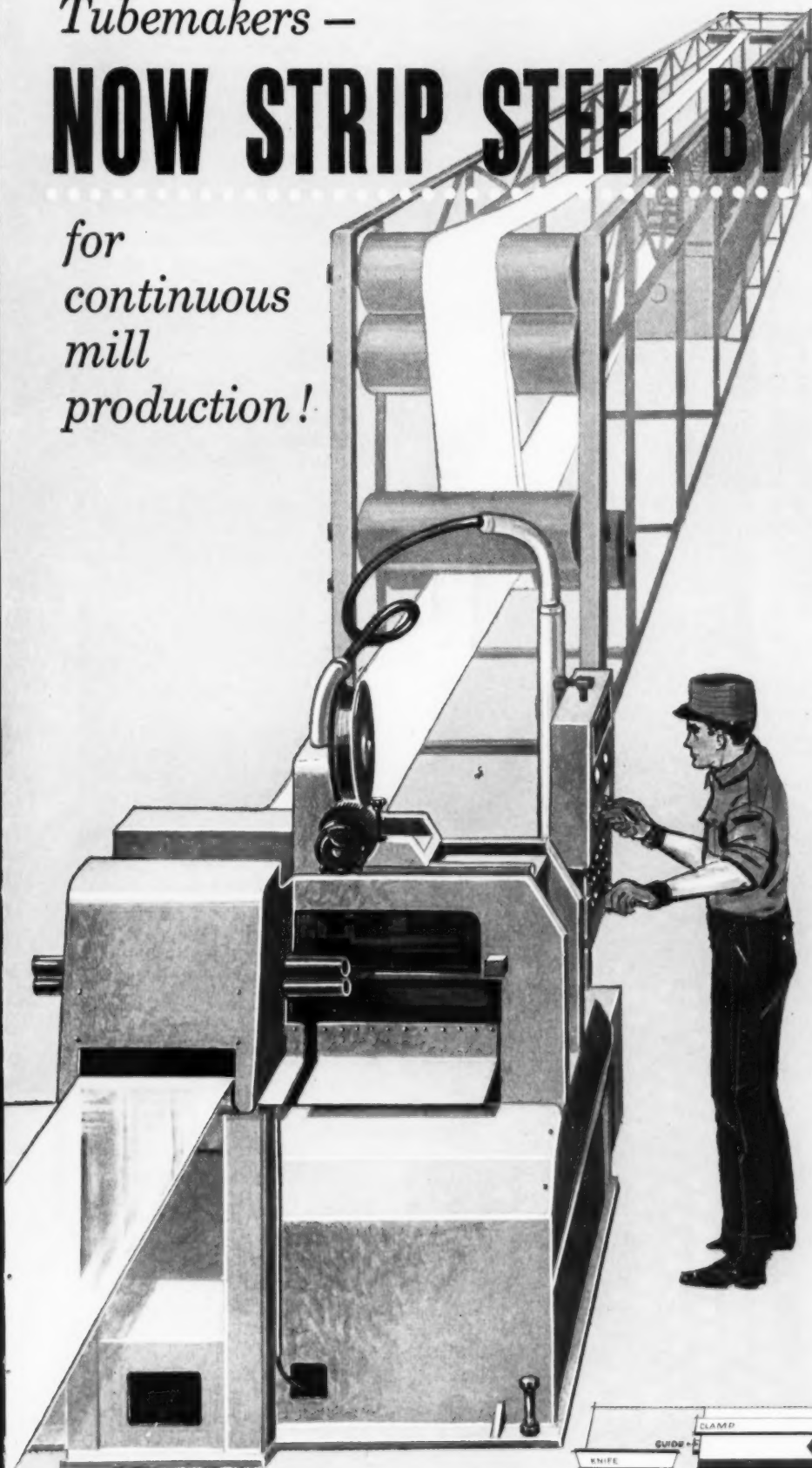
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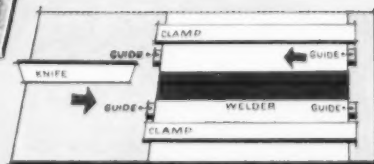


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in connection
with high
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This tube support is 21'6" long; 6'7" wide and weighs 8900 pounds. It looks like a single casting. Actually it is made up of three sections welded together in zig-zag strips across the face. It's a Duraloy HH casting designed for an oil refinery cracking still.

Welding is assuming greater and greater importance in the production of high alloy castings. Often it is the only way to produce large tonnage or unusually shaped pieces. During our many years of experience in producing both high alloy static and centrifugal castings, we have developed sound welding techniques for such castings. Carbon steel welding techniques won't serve. It takes special know-how for chrome-iron and chrome-nickel.

You can rest assured that if the chrome-iron or chrome-nickel castings you order from us require any welding, it will be done skillfully.

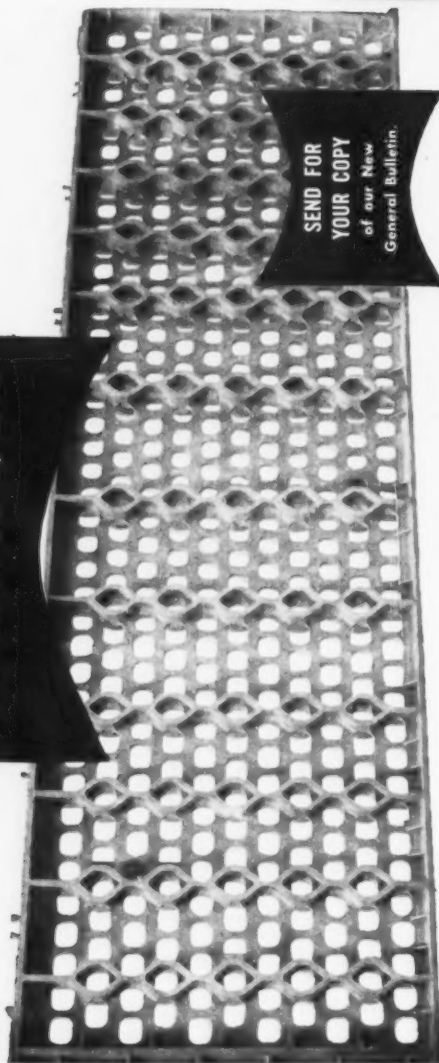
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PERSONNEL

Gray Worthington, named regional sales manager, **Rolled Steel Corp.**, Chicago.

J. Harold Bushman, appointed chief engineer, **Allegheny Steel Band Co.**, Pittsburgh, Pa.

Raymond Carl Wagner, named contracts administrator, **Servo Corp. of America**, New York.

Charles H. Zweifel, appointed chief engineer, **Pacific Coast Engineering Co.**, Alameda, Calif.

David R. Bacon and **Charles E. Dandois**, named sales representatives, Allentown, Pa., office, **Allis-Chalmers Industries Group**.

R. D. Tegtmeier, named comptroller, Winchester-Wester Div., **Olin Mathieson Chemical Corp.**, New York.

W. A. Hunter, appointed project and development engineer, Beardsley & Piper Div., **Pettibone Mulliken Corp.**, Chicago.

Elliott D. Linton, named asst. manager, Distributor Sales Promotion Dept., **Norton Co.**, Worcester, Mass.

Ervin J. Baumrucker, named general sales manager, **Clearing Machine Corp.**, Chicago.

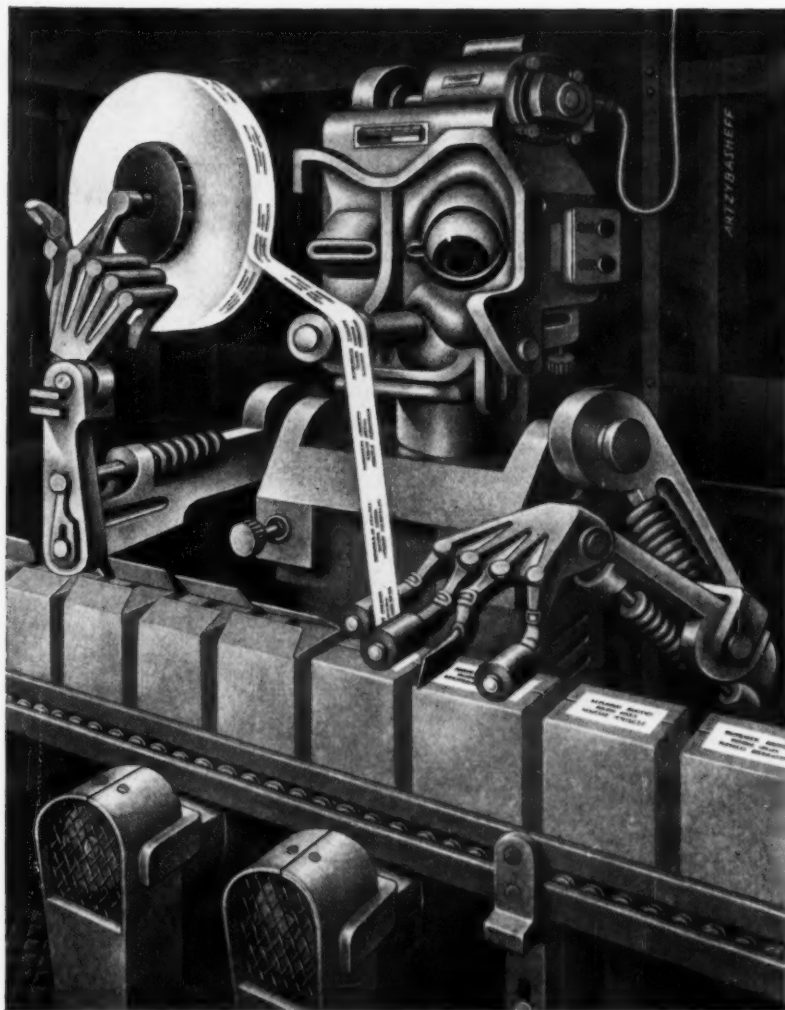
Neil W. Zundel, appointed manager, transportation market sales, **Reynolds Metals Co.**, Louisville, Ky.

Adolph G. Abramson, named director, economic planning, **SKF Industries, Inc.**, Philadelphia.

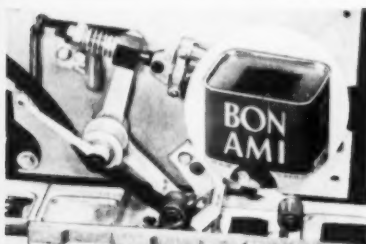
E. A. Rolf, named sales engineer, Detroit office, **R. K. Le Blond Machine Tool Co.**, Cincinnati, O.

Charles E. Muller, named sales representative, general purpose equipment branch, Chicago, **Allis-Chalmers Industries Group**; **Ralph B. Piening**, named sales representative, Chicago.

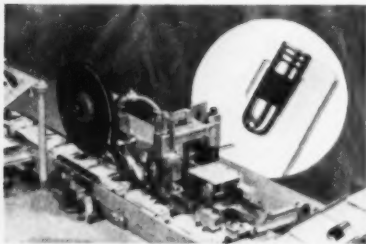
Merl Smith, named sales representative, Portland, Oregon, district, **Allis-Chalmers Industries Group**.



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FLAT-SURFACE applicator, dramatized by Artzybasheff at left, automatically applies predetermined lengths of tape to moving objects at production-line speeds of better than a unit a second.



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But you have to operate an "RPMster" to see why it's literally the finest value in vibration-free, variable-speed drilling available. Write for details on a demonstration at your "Buffalo" machine tool dealer's.



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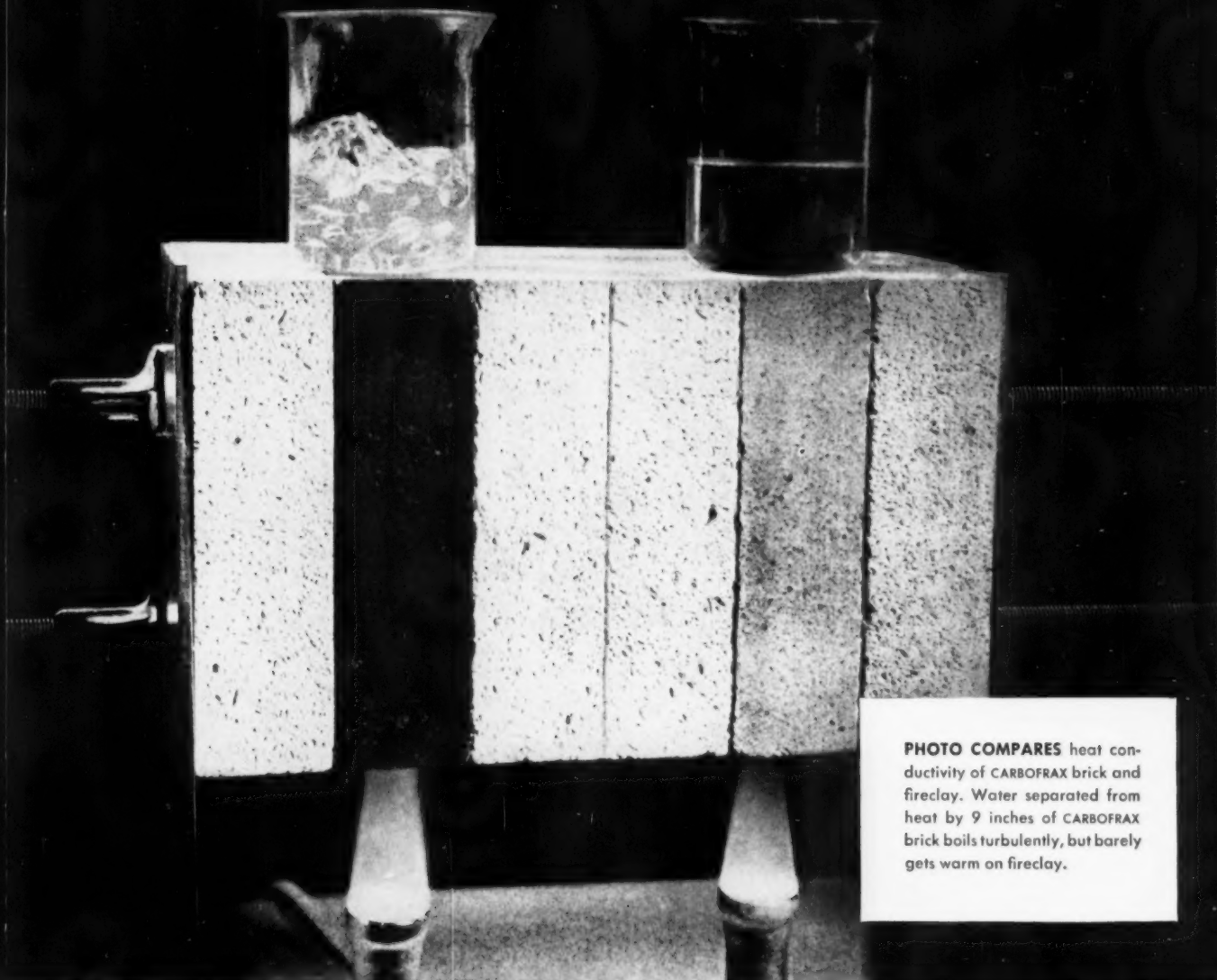


PHOTO COMPARES heat conductivity of CARBOFRAX brick and fireclay. Water separated from heat by 9 inches of CARBOFRAX brick boils turbulently, but barely gets warm on fireclay.

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Choose the right one—

Stamping: What Type Dies To Use

By FEDERICO STRASSER, Consultant, Santiago, Chile

♦ Choosing between separate, compound or progressive dies is never easy . . . But on your decisions rest the profits for the individual stamping job . . . Ways exist to simplify the task.

♦ Three die types are compared in labor costs, tooling costs, the accuracy possible and production rate . . . Compound dies offer advantages in high volume production; but sometimes separate dies do also.

♦ BEFORE YOU sits a prototype part, a would-be stamping. Its blueprints lie beneath. Your design engineer, or perhaps a customer, left them there.

It's up to you to produce the stamping at the lowest possible cost. Or if you are a job shop stamper, you need a realistic quotation to stand any chance of getting the order.

How do you propose to stamp the part now: on separate, com-

pound or progressive type dies?

Your choice can make a big difference in cost per part. Labor on separate die work runs more than double that of the other two stamping methods. Compound dies come high in price, so the production volume had better justify the expense.

Choosing between separate, compound or progressive type dies will never be an easy task. But it's got to be done. There are ways to simplify the job.

By knowing how the various cost factors interrelate, by knowing how to apply cost data to your own shop, you've already taken a step toward the correct decision.

What are these factors?

They all start flat

First, remember that even complex stamped parts start out as a flat sheet of metal. So the tips given here apply not only to simple stampings, but also to the more complex. Parts with compound bends, irregular contours and multiple holes, even some drawn shells, fall into this class. Somewhere along the line, they all go

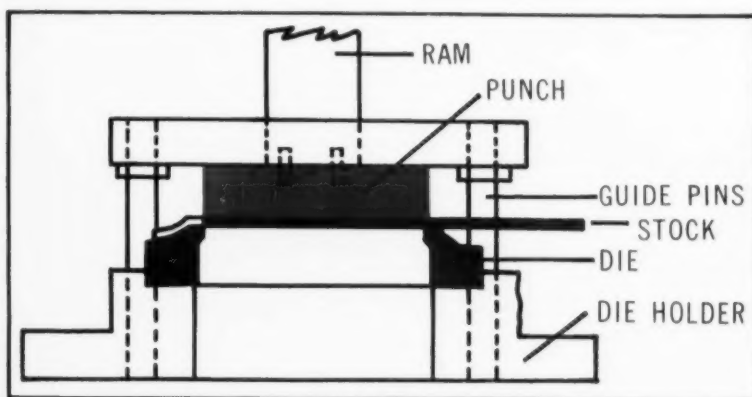


FIG. 1—Stamping on separate dies involves low tooling, high labor cost.

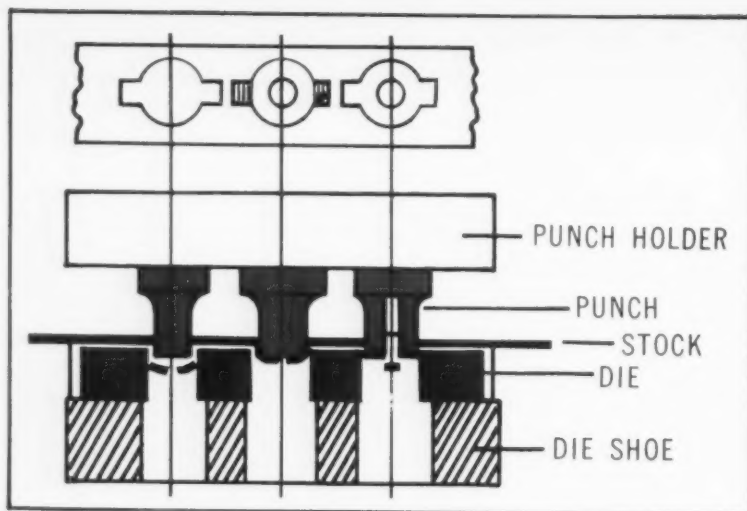


FIG. 2—Strip feeds continuously into progressive type die, which blanks, forms and cuts off at stations one, two and three.

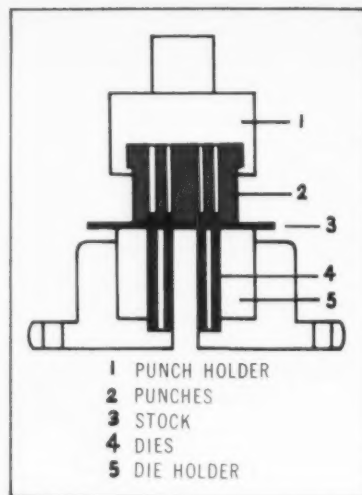


FIG. 3—Compound die blanks and pierces to cut three washers at once.

through a simple blanking and punching operation.

Figs. 1, 2 and 3 define the three types of dies in point here.

On separate dies, the individual part undergoes only one cutting operation per press stroke. That may be either blanking or punching. Sometimes more than one part is stamped per stroke. Even there, so long as each part is cut only once, it's considered a separate die operation.

Progressive type dies involve two or more work stations. Typically, holes are first punched in the strip; then the blank contour is stamped around the holes. Bending or forming may occur at a later station, followed by cutoff.

With compound dies, both holes and blank contour are stamped at once. Usually the compound die is of inverted construction. This means that if the blanking die is found on the upper die shoe, the blanking punch is located on the lower die shoe.

In some cases (as with washers), parts are blanked concentrically on compound dies. Fig. 3 shows this. Washers are stamped one inside the other in the same press operation.

Distinguish compound dies from combination dies. The latter term usually refers to dies in which the part is formed or drawn as it is blanked or punched.

Separate, compound and progressive type dies have certain points in common. It's really this that makes for confusion. So here, concentrate on the differences between them.

To do this, consider these points: (1) the size, shape, thickness and material of the blank, (2) the size and shape of the holes to be punched, (3) the production volume, (4) maximum costs permitted, both for the parts and for the tooling, (5) the accuracy with which the part must be stamped, (6) the desired production rate, (7) toolroom and pressroom facilities, and (8) the time at your disposal.

Compare costs

Match your shop costs against these factors where feasible. At this point, the choice of dies may already be obvious. If doubt remains, compare the costs by graphing on a break-even chart.

As you do this, remember that certain generalizations may be made about each process for (1) tooling costs, (2) labor costs, (3) tolerances, and (4) production rate.

Separate dies cost the least. But they involve the highest cost in labor, more than twice that of the other two stamping methods. Accuracy is moderate. Production rate is very slow. Output runs a fraction of the other two methods.

Location of the burr side is indifferent, at least for symmetric workpieces. Depending on design needs, the burr from blanking and that from punching may be on the same or opposite sides. With asymmetric parts, nesting of the blank in the die governs the position of the burr side.

Progressive type dies cost somewhat more than separate dies. Labor cost is less. Closer tolerances are possible than with separate dies. But maintaining such tolerances depends largely on the skill, care and interest of the press operator. Production rate is very high.

Compound dies have only one major disadvantage: They are costly. On the positive side, they offer high part accuracy. It's possible to hold close tolerances, both in locating holes relative to one another and with respect to the outer contour of the blank. The accuracy results from the precision with which the tool is made, and not from the pressman.

Labor cost with compound dies is the lowest of the three. Presswork doesn't call for greatly skilled operators. Production rate is quite high, a little better than with progressive dies.

Although separate dies have several major disadvantages, they still are widely used. This because separate dies can some-

times handle parts that neither progressive nor compound dies can stamp as well or as cheaply.

Large blanks frequently require use of separate dies. It's hard to stamp large blanks on progressive dies without getting into oversized presses. Compound dies usually are not economical. This because large blanks seldom are stamped in sufficient volume to justify the high tooling cost.

Thick workpieces often end up on separate dies because of limited shop facilities. This is particularly so if many holes are punched, or if the blank has a long contour. Press cutting pressures can be just too high for compound die work on available equipment.

In stamping materials of high tensile strength, the same idea applies. High press pressures required may indicate separate dies.

With short press runs or experimental jobs, separate dies are the obvious choice. There, tooling cost dominates. Labor and raw material costs are of no great significance.

The initial cost of a progressive type die is much higher than the combined costs of a die set comprising separate blanking and punching dies. The same cost picture applies to compound dies versus separate die sets.

Maintenance costs on complicated, multi-operation dies are very high. That factor alone can dictate separate dies. Even in high-volume production, often you will prefer to separate the presswork into two or more operations.

Space out holes

If large openings must be cut near very small ones, look out for trouble with compound dies. Plastic flow of the metal is the culprit. To avoid difficulties, consider dividing the cutting into more than one operation. Progressive or separate dies will accomplish this.

In workpieces later bent, holes too near the bending line may distort as the part is formed to final shape. The solution here is to pierce after bending in separate dies. The same suggestion applies when the holes must be located precisely in relation to one another in bent parts.

Parts later drawn are another example of where blanking and punching should not be combined. If holes are punched before drawing, they tend to wander from true location in the drawing process. Again, separate punching dies are the answer.

Compound and progressive type dies suffer from a relative lack of flexibility. One die normally does only one job. A design change can call for a costly investment in a new die.

Try separate dies

With a sequence of separate dies, on the other hand, altering the design can involve scrapping or modifying only one simple die. Most often this is done at far less cost than that for replacing an entire compound die.

Of course, you can go to progressive type dies with removable or interchangeable blanking or punching inserts. But this in turn introduces problems. The progressive type die then costs even more. In addition, maintenance can be a greater problem.

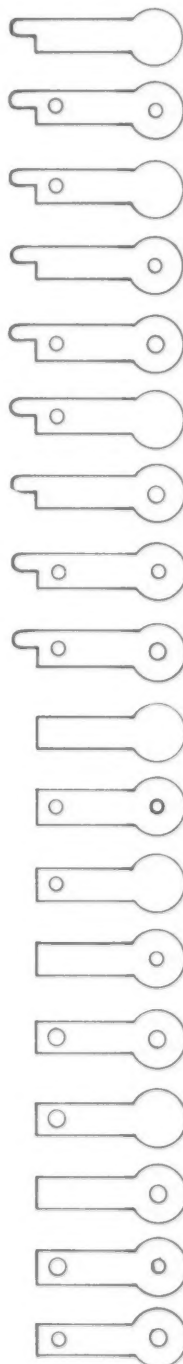
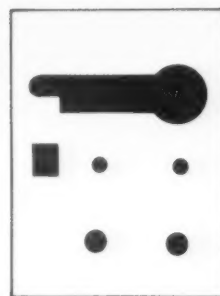
Even so, dies with removable punches do offer great advantage at times. Fig. 4 is an example. Note the die design is almost standard. It has a blanking hole, four round punching holes, and a rectangular punching hole.

By simply inserting and removing punches, 18 different parts are possible.

Your past experience will naturally help in predicting which type die to use. But don't overlook minor details. They may be critical. Know which areas of the stamping are critical: those calling for close tolerances or needed for location. Then go to the type of die that will do the job. Consider also how critical specifications will affect die selection. Finally, know your own shop costs.

FIG. 4 (right)—A blanking hole plus five punch holes make possible 18 different parts from one die.

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Cast Titanium Gets Set For Commercial Use

◆ Contrary to what you've probably heard, cast titanium parts are approaching the commercial stage . . . It'll pay you to keep abreast of happenings in this fast-breaking area of the titanium business . . . Here's a status report.

◆ Casting titanium is no cinch . . . Lots of questions still need answering . . . These include how to cut contamination to lower levels, and what to do about casting alloys . . . But titanium parts can be and are being cast successfully right now.

◆ YOU'VE probably checked into using cast titanium parts because the metal itself had the basic properties you wanted. But at the time, they were too difficult or impossible to make, or just too expensive. If that was the only drawback, it's time for another look. New developments may get you to change your mind. Right now, in fact, you can have titanium castings with no surface contamination. Formerly, contamination was a serious drawback.

A two-step process achieves the goal. First, the titanium part is cast oversize. Then pickling removes contamination. The technique is so finely controlled that pickling removes metal uniformly. As-cast contours remain in the same relation to one another.

Current work gives hope that pickling can be eliminated. Titanium parts can be cast consistently

without running into hardness and brittleness problems. Some contamination still remains, however.

Problems in casting titanium show themselves largely in two areas: melting practice and mold materials. The villain almost always is contamination. It arises primarily from the metal's contact with air, or with the surface of the melt crucible or the mold itself.

Air and hot titanium don't get along together. Molten titanium dissolves oxygen and nitrogen rapidly. When thus contaminated, it becomes hard, brittle and difficult to machine. So air must be excluded from the melting process.

Then too, molten titanium reacts chemically with all known refractories and mold materials. It severely erodes crucibles of such refractory oxides as silica, alumina, magnesia and zirconia. In doing this, the titanium becomes so contaminated that it loses its desirable properties.

Graphite crucibles resist chemical action by molten titanium bet-

ter than refractory oxides. But some graphite is dissolved. Titanium melted in graphite crucibles usually picks up about 0.35 to 1.0 pct carbon. Table 1 shows how these small amounts of carbon increase hardness and strength. At the same time, they reduce ductility to the point of embrittlement.

Is there a thought nagging you, perhaps about successful casting of titanium ingots? Quite right—titanium ingots present fewer casting problems. But there's a difference between casting ingots and casting to a specific shape.

Titanium ingots are cast by progressively melting layers of titanium in a cold mold. Casting titanium to specific shapes involves pouring a large molten pool of tita-

■ This status report is based largely on material supplied by the Titanium Metallurgical Laboratory of Battelle Memorial Institute, Columbus, O. It is supplemented by exclusive information developed in Iron Age interviews.

Table 1

What Carbon Does To Titanium

Carbon content, pct	Tensile strength, psi	Elongation, pct in. 1.4 in.	Reduction of area, pct	Hardness, Bhn (3000-kg load)
0.04	70,000	28	40	158
0.25	90,000	9	11	182
0.70	91,000	2.5	1.5	217

Table 2
Baked Sand-Molding Mix

Ingredient	Pct
Core oil	1
Silica flour	5¾
Pitch	1¾
Royal binder	2¾
Cereal binder	½
Water	3½
Silica sand	balance

nium into a mold. It's the latter process that gives trouble.

To melt titanium, electric arc and induction furnaces seem generally suitable. All operate either under vacuum or an inert gas atmosphere to avoid air contamination. The consumable-electrode, skull-melting furnace has done the best job to date.

At the U. S. Bureau of Mines Experimental Station in Albany, Ore., a furnace of this type supplies melts for casting titanium breech blocks weighing up to 75 lb.

The Bureau of Mines furnace melts 90 to 100 lb of titanium in about 15 minutes. The 10-in. diam copper crucible is water cooled. The copper chill causes a titanium shell to form around the inside of the crucible. The shell, or skull as it is known, keeps molten titanium from contacting the crucible surface and becoming contaminated.

The furnace works under high vacuum, about 150-microns pressure. Current is 8000-9000 amp at 28-30v with an 8-in. diam consumable electrode. This electrode can be compacted titanium sponge, titanium ingot, or scrap titanium pieces welded together.

Induction furnaces prove satisfactory when contamination is of less concern. Such might be the case with cast valve bodies and pipe tees for marine service; there the interest is primarily in cor-

rosion resistance and not ductility.

Contamination of titanium melted in graphite-lined induction furnaces has been held to 0.7 pct carbon. Above 0.7 pct carbon, titanium is considered unmachinable on a production basis.

Recent work with strong electrical fields promises more of the induction furnaces. The strong intensity electric current not only shortens melt time, but also forces the molten titanium to assume a conical shape in the crucible. This reduces contact area between melt and crucible. In this manner, titanium sponge containing 0.025 pct carbon has been melted to 5-lb ingots with 0.066 to 0.15 pct carbon.

Additional work is needed to prove the value of this induction melting technique.

Mold materials present a similar set of problems.

Machined graphite remains the best material for smooth, sound castings with negligible surface contamination. These molds are costly to make and short-lived. Even molds of simple shape begin to crack and spall after 30 to 40 pourings.

Machined carbon molds suggest themselves as a less costly alternate. Unfortunately, results are not as good. Contamination by carbon is greater. Worse, molten titanium wets the carbon mold. This means molds must be broken away from the cooled castings, destroying the mold after one pouring.

Shell molds can make quality titanium castings. Right now the limitation is part thickness: no more than ½ in. sections. Below this, shell molds give good surface finishes. But shell molded castings with cross sections greater than ½ in. show pinholes on the surface. Extensive mold reaction causes this.

Contamination varies

Contamination from shell molds varies from 0.020 to 0.040 in. deep on ½ in. thick sections. With 1 in. sections, contamination goes as deep as 0.030 to 0.060 in. Compare this with machined graphite mold contamination averaging 0.010 in. deep in sections up to 1-in. thick.

Still, shell-mold contamination may not be as serious as it sounds. Remember it is not carbon. It's

Table 3

How Smooth Are Titanium Investment Castings?

Mold material	Mold binder	Surface smoothness, microinch, rms			
		Step thickness, in.			
		1/8	1/4	1/2	1
zirconia	ethyl silicate	150-170	150-170	140-160	120-150
zirconia	zirconium nitrate	100-120	120-140	120-150	130-160
silica	ethyl silicate	130-170	120-160	170-220	rough
ferrolite	—	130-160	130-160	150-190	180-270

Table 4

Powdered Graphite Mold Mix

Ingredient	Pct
Graphite powder (electric furnace; -20 to 100 mesh)	53
Cornstarch	10
Pitch, pulverized	10
Carbonaceous cement	8
Surface active agent	1
Water	18

Table 5

Titanium's Mechanical Properties Cast In Powdered Graphite Molds

Tensile strength, psi	44,500
Yield strength, psi	28,000
Elongation, pct in 1 in.	52
Charpy impact, ft-lb	50
Hardness, Bhn*	95

* Sponge base hardness was 95 Bhn

not known yet whether this type of surface contamination will affect service life of the casting. Conceivably, no harm will result.

To make shell molds, a fusible mixture is dumped over a heated metal pattern. The mix contains granular refractory oxide plus 2 to 6 pct phenol formaldehyde resin as a binder. Alumina, magnesia, silica, zircon and zirconia, among others, have been tried as mold materials.

On melting, the hot pattern is inverted to shake off excess molding mix. The pattern and its adherent refractory oxide shell then cure in a hot oven. After curing, the shells measure $\frac{1}{8}$ to $\frac{3}{16}$ in. thick, and lift off the pattern easily.

Battelle Memorial Institute reports getting the best shell molded finish from electrically fused alu-

mina containing 0.5 pct magnesium silicofluoride.

Baked sand molds promise less than shell molds. Even so, progress has been made. Table 2 details the most satisfactory molding sand mixture found by Armour Research Foundation.

Baked sand molds

Two major troubles show up with this sand mix. First, low mold permeability causes blowholes and flaws, brought about by entrapped gas. Gas forming material remains in the sand molds after baking. This introduces the danger of contaminating the titanium melt when pouring.

Aeronautical Research Laboratory at Wright-Patterson Air Force Base suggests baked sand molds of zirconia plus 6.45 pct titanium

metal powder. The titanium in solution with zirconia sand results in a low-oxygen mixture. This means a sand mold less prone to attack by molten titanium. Mold shrinkage on baking is high, limiting usefulness. This might be corrected by pre-firing the material.

Similar reasoning has led Battelle to feel that lower contamination will result from using a binder lacking nitrogen or oxygen. Cutting the weight of binder in the mix will have the same effect.

Battelle's check into investment casting mold materials shows the best castings come about with use of ethyl silicate or zirconium nitrate binder with silica or zirconia investment. Castings from zircon or sillimanite molds are inferior to those from silica or zirconia molds.

Table 6 Mechanical Properties Of Experimental Titanium Alloys Cast In Machined Graphite Molds

Alloy	Tensile strength, psi	Yield strength, psi	Elongation, pct	Reduction of area, pct	Hardness, Bhn	Impact strength ft-lb
Unalloyed	48,000	31,000	38	50	111	66
Ti-4Al	91,000	80,000	14	14	223	60
Ti-6Al	116,000	107,000	10	26	255	42
Ti-7Al	108,000	103,000	11	26	259	53
Ti-0.25C	90,000	66,000	9	11	182	11
Ti-0.7C	91,000	81,000	2.5	1.5	217	2.5
Ti-2Fe*	105,000	—	2.6	—	—	—
Ti-0.1Si	64,000	52,000	32	65	143	23
Ti-0.2Si	68,000	51,000	32	60	143	22
Ti-0.9Si	89,000	76,000	17	29	192	38
Ti-1.8Si	104,000	98,000	1.5	3	229	5
Ti-3Si	74,000	69,000	0.07	0.25	235	2
Ti-4Al-0.1Si	93,000	80,000	14.5	29	212	57
Ti-4Al-0.5Si	108,000	95,000	12	25	245	38
Ti-4Al-1Si	122,000	116,000	9.5	23	273	—
Ti-6Al-0.1Si	112,000	105,000	11	21	248	43
Ti-6Al-0.5Si	126,000	119,000	9.5	21	277	28
Ti-6Al-1Si	146,000	139,000	7.5	17	305	14
Ti-1Al-4Mn	149,000	140,000	5	9	—	6
Ti-4Cr-2Mo	124,000	101,000	11	15	—	12
Ti-7Al-3Mo**	136,000	120,000	10	12.4	—	—
Ti-6Al-4V**	137,000	127,000	7	17.6	—	—

* Melted in a graphite-lined induction furnace. All other alloys prepared in fixed-electrode, skull-melting furnaces.

** As-cast and after heat treatment. See text for comparison with forged properties.

Table 3 illustrates this clearly.

Hardness tests of the investment cast specimens indicate contamination to about the same depth as the shell molded parts. Again, the effect of surface contamination on the service life of the investment casting isn't yet known.

Expendable molds of compressed graphite powder offer much. One firm reports consistently casting titanium in such molds with surface contamination as little as 0.015 in. deep.

The same source claims production-type casting of 8-lb valve bodies in powdered graphite molds. Chemical contamination and increase in hardness either did not exist, or fell below the sensitivity of the test instruments.

Test cubes, 2 x 2 x 2 in., cast in powdered graphite step molds show surface contamination averaging 0.025 in. deep. The approach here is to simulate standard foundry practice as closely as possible. To this end, work continues on applying the graphite powder technique to shell molding and investment casting.

Work in expendable molds of powdered graphite has been reported by E. I. du Pont de Nemours & Co., Inc. There the mold material is compressed under 50 to 85 psi. Advantages claimed by the process include: (1) Manufacturing is economical, since molds can be made with existing foundry techniques, (2) Castings are relatively uncontaminated by the mold material.

Table 4 shows the composition of the patented mold mixture. The surface active agent is Duponol G, a du Pont product. Cornstarch binder supplies green strength.

Pitch and carbonaceous cement form a high-temperature bond when the mold is fired for 1 to 2 hours at 1290°-1650°F. Both must be used for smooth surface in the mold cavity with good resistance to spalling.

Firing is preceded by (1) room temperature drying for 8 to 72 hours, and (2) gradual heating to 140°-250°F over a 48-hour period.

Resulting molds are hard and permeable. They can be handled with little danger of breakage. Mold shrinkage in curing is about 3/16 in. per foot.

Who Wants Titanium Castings?

Aircraft makers

Atomic energy people

Boat builders

Chemical processors

**Electroplaters and
anodizers**

Food processors

Ore beneficiation firms

Paper manufacturers

Pharmaceutical houses

Power suppliers

Mechanical properties of a 7-lb part of unalloyed titanium cast in such a mold show in Table 5. Chemical analysis of the casting reveals it contained 0.06 pct carbon, 0.004 pct nitrogen and 95 ppm hydrogen. Such findings speak strongly for good control over the melting and casting operation.

Surface contamination averages 0.040 in. deep in specimens cast in du Pont's expendable molds. Compare this with an 0.010 in. average for machined graphite molds. No porosity has been found.

New alloys coming

In casting titanium, there's some agreement that oversized gating systems produce sounder parts. But if melts are adequately superheated, gating systems need be no larger than for other cast metals. Techniques for measuring superheat are not yet entirely satisfactory.

Titanium alloys generally seem to cast as readily as unalloyed titanium. This holds true at least

Who's Working On Titanium Castings?

Here are some of the groups who have played a major role in improving cast titanium parts.

**Armour Research Foundation
Battelle Memorial Institute
Crane Co.**

**E. I. du Pont de Nemours &
Co., Inc.**

**Frankford Arsenal
Howard Foundry Co.
Mericast Corp.**

**National Research Corp.
Oregon Metallurgical Corp.
Rem-Cru Titanium, Inc.**

**U.S. Bureau of Mines
U.S. Naval Ordnance Test
station**

**Watertown Arsenal
Wisconsin Centrifugal Foundry, Inc.
Wright-Patterson Air Force
Base**

for the alpha and the alpha-beta alloys. The meta-stable beta alloys have wide freezing ranges; some trouble in casting these has been reported.

Work so far has been largely with the wrought alloys. Development of titanium alloys specifically for casting should lead to better properties (see Table 6). Frankford Arsenal feels Ti-Fe and Ti-Fe-V alloys not only may possess better casting properties, but also may prove easier to machine than the wrought titanium alloys now available.

The last two alloys in Table 6 are late developments. As forged and heat treated, the Ti-7Al-3Mo shows 160,000 psi tensile strength, 140,000 psi yield strength, 10 pct elongation, and 15 pct reduction in area. The values corresponding for forged and heat treated Ti-6Al-4V alloy are 140,000 psi tensile, 130,000 psi yield, 11 pct elongation and 38 pct reduction in area. Heat treatment technique has not yet been revealed.

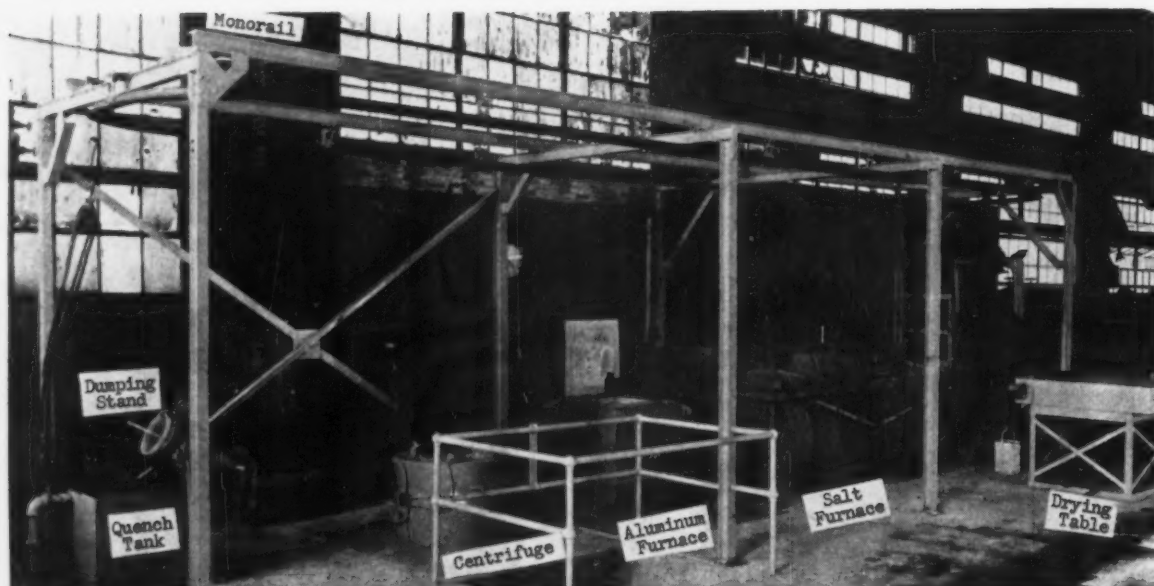


FIG 1. Precleaned parts move from precleaning line (not shown) to drying table (far right) and on along coating line to quench tank at left. An overhead monorail handles baskets and racks.

Aluminum-Coat Steel Parts For All-Weather Wear

By R. F. JOY, Engineer, Research Dept., Bethlehem Steel Co., Bethlehem, Pa.

♦ There are half-a-dozen ways you can buck atmospheric corrosion in designing hardware for rugged out-of-doors service . . . You can paint or galvanize steels, or go over to aluminum, copper, or stainless . . . It's a question generally of equating corrosion resistance against cost.

♦ A practical, inexpensive method now simplifies aluminum-coating steel parts . . . Results have been excellent on utility pole-line hardware, which must stand up under long years of atmospheric abuse . . . Parts coated include bolts from 1/4-in. in diam to pieces up to 38-in. in length.

♦ YOU CAN GET AROUND the problem of atmospheric corrosion in half a dozen ways, in designing hardware for rugged outdoor service. With low-carbon steels, you can paint parts, or galvanize them—sometimes both. Or you can start

off by specifying that aluminum, copper, low-alloy or stainless steels be used.

Deciding calls for a nice balancing of such factors as strength and required degree of corrosion-resistance against costs.

Bethlehem Steel Co. has met the problem of improving atmospheric corrosion resistance of hardware by developing a practical, inexpensive method for aluminum-coating steel parts.

The problem was particularly acute for the utility companies. With the development of new preservatives for wooden poles carrying telephone and power lines, utilities have been able to boost expected pole life to 25 to 30 years. But galvanized pole line hardware—in some localities—has been good for only 10 to 15 years. This meant at least a single replacement—perhaps two—during the life of the pole.

This has been costly, in terms of high labor costs and material and in terms of necessary interruptions to customer service.

But to get around the maintenance problem by using hardware with life at least equal to that of the pole meant going over to aluminum, copper, stainless or alloy steels. These alternatives are costly. They mean that the manufacturer has to carry special stocks of material and make special manufacturing setups.

The new method for commercially aluminum-coating steel was 2½ years in development. Aluminum was chosen because of its proven success in resisting severe atmospheric corrosion when used for electrical conductors, street-lighting fixtures and other products with which utility engineers were already familiar.

Bethlehem's method for extending aluminum-coating to pole-line

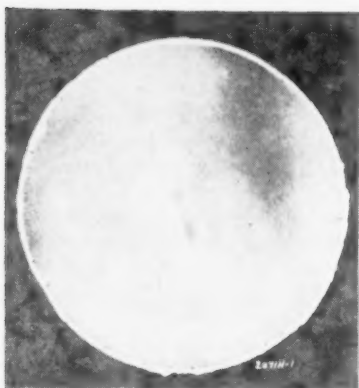


FIG 2. Enlarged cross-sectional photomicrograph of 5/8-in. diam insulator pin shows uniformity of the coating. Aluminum area shows up white, with the steel dark gray.

hardware consists, essentially, of heating in a fused salt flux prior to dipping into an aluminum bath.

A truly, chemically-clean steel surface is particularly important to successful aluminum coating, so parts are dipped in fused salt (held at 900°F) as a first step in the cleaning line. This burns off any oil or grease which might be left on parts after the alkali degrease which immediately follows manufacturing. At the same time, it changes any forging or rolling scale to a form which an acid pickle will readily remove.

Parts are basket-loaded, 200 to 250 lb at a time, and are immersed for periods of from 5 to 15 minutes, depending on the amount of oil and scale on the parts. This is followed by a rinse in cold overflowing water.

Pickle time's halved

Next step is acid pickling. This is carried out in an 8 to 10 pct H₂SO₄ solution held at 160° to 180°F. Pickle time ranges, again, from 5 to 15 minutes—about one-half that required for material not salt-cleaned first.

After cold-water rinsing, parts dump onto a vibrating conveyor and are fed into a steam-heated drying and storage hopper.

Parts are now cleaned and dried and ready for the coating line. They load directly into coating baskets from the drying and storage hopper, about 50 lb to the basket. Coating baskets (six at a

time can be accommodated) are then suspended in the fused preheating and fluxing salt bath. This is an overhung electrode furnace of 200 kw capacity, 94 in. long x 18 in. wide and 40 in. deep. Bath temperature is held between 1300° and 1350°F.

An air-operated agitator arm keeps the baskets in vertical motion as they pass through the furnace, allowing trapped air to escape and bringing fresh salt into contact with parts.

Time in this bath runs from 8 to 15 minutes.

After fluxing, the basket moves quickly to the aluminum furnace. Here it's pulled up and down a few times, breaking the aluminum surface each time. Stirring of the parts is required if they are small and tightly packed in the basket. This ensures that molten aluminum contacts every part of the product.

Bath temperature is held between 1290 and 1300°F, and immersion time ranges from 1 to 3 minutes, depending on what thickness of

coating is wanted. Average coating runs about 2½ mils (0.0025 in.) in thickness. This thickness of aluminum coating is equivalent to a zinc coating of 1.5 oz per sq ft.

From the aluminum pots the coating basket is rapidly positioned into a centrifuge. This equipment is capable of operating at various speeds, depending on the product. Large, unthreaded parts are centrifuged at slow speed, while small threaded bolts must be centrifuged at higher speeds. Centrifuge times vary from 15 to 60 seconds.

Most products are water-quenched. The coating basket is placed in a dumping stand and the product is emptied directly into cold water. All coating baskets or racks are handled by overhead monorail. The quench tank shown in Fig. 1 has since been replaced by a larger tank with built-in conveyor for removing finished parts.

A variety of products have been coated including bolts as small as 1/4-in. diam. Present practical length limit on parts is 38 in.

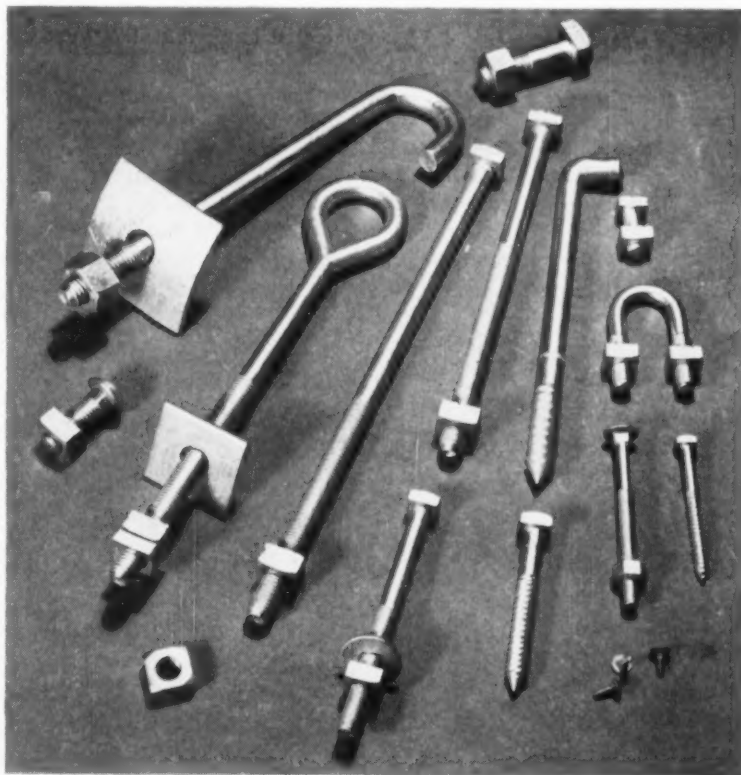


FIG 3. Some typical threaded varieties of pole line hardware are shown after coating. Bolts as small as 3/16-in. have been coated, but 1/4-in. size is considered lower practical limit because of problems of handling.

How To Avoid Problems With Damp Electrodes

By A. C. WARD, Welding Dept., General Electric Co., York, Pa.

♦ Lime or titania coatings on stainless arc welding electrodes readily absorb moisture . . . Weld with damp electrodes and troubles start . . . Porosity usually shows up, followed by cracking.

♦ Make sure first that porosity is due to damp electrodes, and not to welding technique . . . Then check for moisture by the short circuit test described here . . . An oven bake can restore electrode quality.

♦ DAMPNESS in a low-hydrogen stainless electrode makes the difference between a good weld and a poor one. It will cause surface porosity and weld cracking. Taking proper precautions, it can be detected and avoided.

But how do you know when an electrode is too damp to make a good weld. Four ways exist: (1) From the way the first rod of a batch welds, (2) from the color of the electrode coating, (3) from a

simple short-circuit test, and (4) from laboratory analysis.

Only the last supplies a precise moisture content. But the interest here is not in exactly how much water the coating holds. Rather the shop welder simply asks, "Will I get a good weld?"

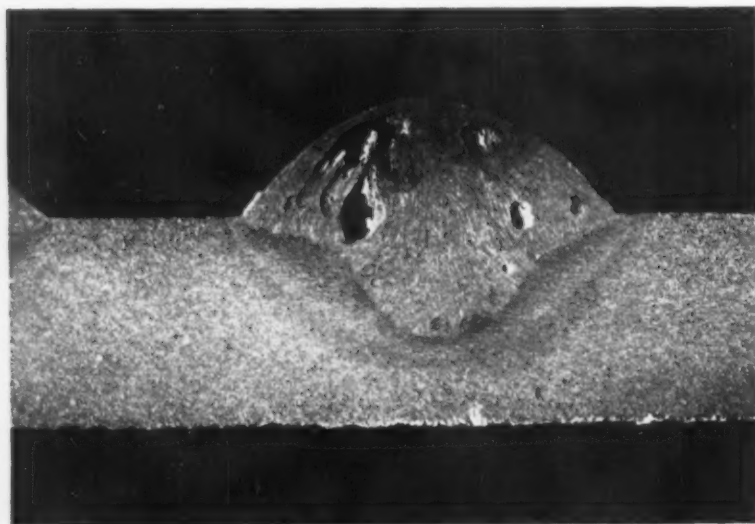
To answer this, it helps to know first how dry electrodes perform. ("Dry" here means a moisture level in the coating as low as that on leaving the factory.)

First, you can expect better weld metal quality of dry electrodes. In addition, you'll note (2) negligible surface porosity, (3) a more stable arc, (4) less spatter loss, and (5) less time lost in post-weld cleaning. Obviously, it's worth going to some trouble to keep your electrodes dry.

Getting specific

The coated electrodes in point here are the AWS-ASTM 300, 400, and 500 series. Add also those low-alloy steel arc welding electrodes and iron powder electrodes available with low-hydrogen coatings.

Electrode producers furnish two general types of low-hydrogen coatings on stainless steel electrodes. One has a lime base; the other a titania base. The lime base coating contains a high proportion of calcium and other alkaline earth minerals. Titania coat-



POROSITY, dramatically illustrated here, can result from damp low-hydrogen electrodes or incorrect welding technique. Note that porosity shown is not visible on the bead surface.

ings include large amounts of titanium-bearing minerals.

The last two numbers identifying the rod are either -15 or -16. Strictly speaking, these numbers tell whether the electrode is for dc reverse polarity current (-15), or both ac and dc current (-16). In practice, the -15 is the lime type coating. Titania coatings in these grades are the -16 electrodes.

Bead differences

Lime-coated stainless electrodes tend to a viscous weld metal at fusion. Its bead shows (1) good mechanical properties, (2) resistance to cracking, and (3) an ability to cope with a wide range of undesirable elements in the base metal, including, phosphorous, sulphur and silicon.

Titania coated electrodes tend to a more fluid weld metal at fusion. Good mechanical properties result, as well as uniform welds, and good arc stability. That last particularly appeals to operators.

Both types of coatings are generally accepted and widely used. Titania-coated stainless electrodes enjoy about a 7:1 preference over those lime coated.

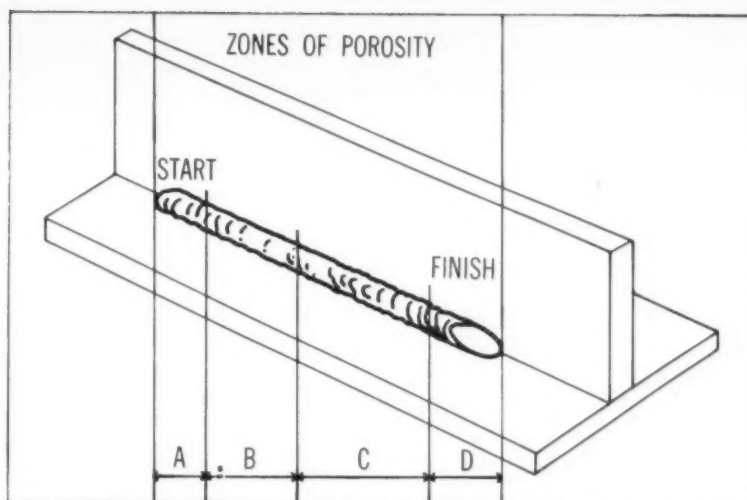
The two coatings require different welding techniques. Fluidity of the slag (rather than the weld metal) causes this.

Lime-coated electrodes can be used with a short, close arc. The technique resembles that with most low-hydrogen mild steel electrodes. A suitable lead angle may be used.

Titania-coated electrodes require a short, close arc. But the electrode should be held almost perpendicular to the molten pool. That helps control slag coverage and prevents air entrapment.

What happens when you weld with a damp electrode? First, porosity of the weld bead occurs. Then the electrode shows a wild, erratic arc and excess spatter. Both conditions tend to correct themselves as the electrode melts. Heating of the metal core drives off the moisture.

But not all porosity is due to moisture. It depends on where in the bead porosity shows up. Fig. 1 gives tips on how to recognize



ZONE	AGENT	REASON
A	Operator	Poor starting technique
A, B	Electrode	Moisture
A, B, C	Base metal	Surface contamination or unusual elements
D	Operator	Poor breaking technique; change in lead-angle
All	Operator or base metal	Faulty low-hydrogen technique and comment for zone C

FIG. 1—Electrode dampness troubleshooting chart

the causes of porosity in welding.

Porosity in the first few inches of the bead alone usually is traced back to starting technique. The operator may hold his arc too long after the initial strike. The base metal may be dirty. The electrode coating may have been stripped too far, destroying the shielding effect. On restrikes, chipping of the coating has the same effect.

How moisture shows

Weld bead showing porosity in both zones A and B most often results from electrode moisture. Porosity continues for the first one to four inches of the weld. It usually clears up as welding progresses with each electrode.

If porosity continues through zones A and B into zone C, suspect the stock material. Check its surface condition. Look into the metal composition for elements that tend to form bases or alkali

line salts. Such elements as carbon, sulphur or silicon will do this.

When porosity appears in zone D, it's usually due to faulty breaking of the arc. A change in lead angle as the electrode is consumed also may bring about porosity.

Where porosity appears sporadically (as only in zone D) or in all zones, watch your technique. It may not be correct for welding with low hydrogen electrodes. Look for an incorrect lead angle or too long an arc length (see Fig. 2). Make sure your lead angle doesn't change as the electrode is consumed.

Beyond these troubleshooting tips, you can still take steps. The obvious one is cutting the water content in the electrode coating before welding.

Moisture gets into the coating in three ways. The electrodes may

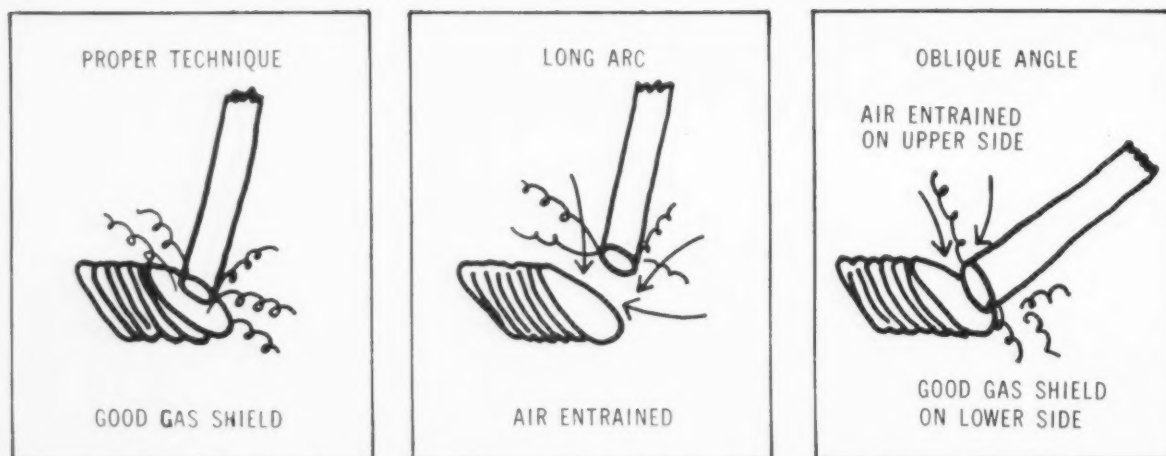


FIG. 2—Either long arc or oblique lead angle can permit entrainment, porosity results. Proper technique prevents this.

become soaked with water due to careless handling. Even if the carton later dries out, the electrodes can remain damp until used.

Then when cold electrodes move into warm shop air, moisture condenses on their surfaces. It's hard to avoid this without special precautions.

Three dampness checks

Finally, most low hydrogen electrodes will form water of crystallization within the electrode coating. The water is usually trapped within the individual crystals. It cannot escape readily without breaking down the crystal. This is the most troublesome type of moisture, especially with lime-coated electrodes.

You can check for dampness

three ways in the shop. First, when an electrode becomes damp, the coating usually shows some color change. This is noticeable more in electrodes coated with lime than with titania.

Then you can check for moisture by comparing the welding performance of an electrode known to be dry with the one suspected. This test also will show whether porosity is due to faulty operator technique.

Single electrodes can be short-circuited to check for dampness. Under extreme conditions, you can actually see steam coming off the coating. Table 1 gives details on this.

After testing, allow the electrode to cool a few minutes before welding. That avoids over-

heating of the core wire at the holder end.

After short circuiting, weld a bead with the dry electrode. If no porosity shows, chances are that moisture can be baked out of the other damp electrodes by a drying oven. An oven temperature of 250°-600°F will do the trick on titania-coated electrodes. Lime coated electrodes call for a temperature of 250°F and up. Time-at-temperature will depend on oven efficiency, the number of layers of electrodes and the total oven load.

Don't underbake

Remember that it's easier to underbake than overbake. But don't throw cold electrodes into a hot oven. The fast thermal change will frequently crack the coatings. Rapid uneven expansion of the core wire and coating does this. Or the heat may rise so rapidly that water boils off violently, and cracks the coating.

If trouble with damp electrodes has shown up earlier on your welding line, consider drying each batch of electrodes immediately before use. An alternative is drying, then storing in a dry atmosphere.

To show the need for this, consider how fast low hydrogen iron powder electrodes pick up moisture. Tests on some show the moisture content can double in two hours and triple in four. This at 85°F and 50 pct relative humidity. Higher humidity increases the rate of moisture absorption.

Table 1

Short Circuit Check For Electrode Dampness

Normal operating current, amp	Rod diam, in.	Short circuit time, sec
25	$\frac{1}{16} = 0.063$	6
80	$\frac{1}{8} = 0.125$	13
100	$\frac{5}{32} = 0.156$	16
250	$\frac{1}{4} = 0.250$	25

Convert electrode diameter to decimal dimensions. Short circuit at normal current rating for number of seconds corresponding to decimal diameter.

Combine Operations To Cut Machining Time

♦ **COMBINING** gundrilling, turning, threading and finishing operations reduces machining time considerably. An oil well equipment manufacturer cut his production time more than one-quarter by doing just that. In fact, gundrilling alone eliminates the need for boring, reaming and honing operations on parts.

Working on a special Gisholt 3L turret lathe with an extra long bed, Baker Oil Tools, Inc. of Los Angeles uses the setup for producing finished retainer production packer bodies for oil and gas wells. The machine tool's bed is 30-in. longer than standard. Cemented carbide tools do the cutting.

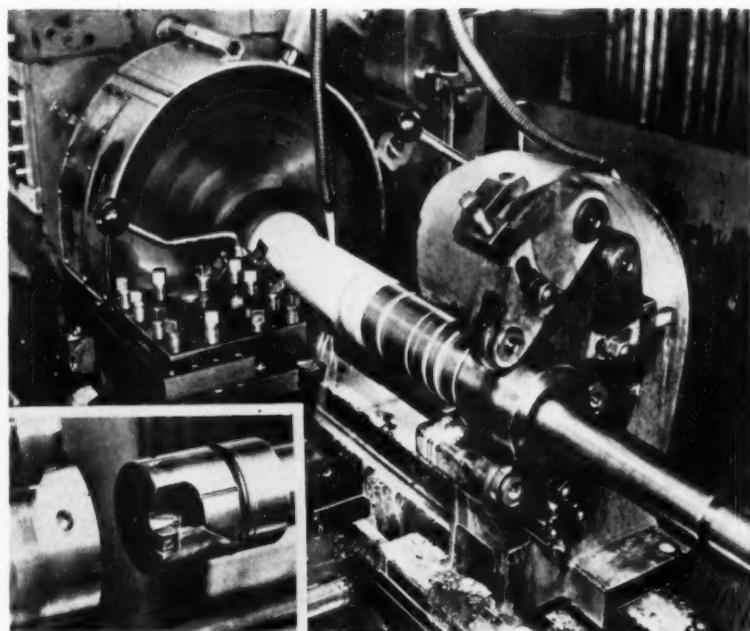
Smooth-bore cylinder

The packer body, of centrifugal cast-iron, is a cylinder with a smooth bore. Special seals shut off the tubing in the packer bore in the same manner that piston rings seal a piston in a cylinder bore.

Prior to the new procedure, the company machined packer bodies by first rough turning the outside diameter. One-half of each workpiece was then rough-bored, turning it end-for-end to rough bore the other half. Running a reamer through finished this phase. At this point, the bodies were shipped out for honing. The work wasn't finished even then; the parts had to be returned to be finish-turned and threaded.

Today, the firm completes all turning requirements in two main operations. These combine the several separate steps used previously. Once the machine is setup for a production run, it is not touched for several months, except for several periodic checks. Setting up takes about four hours.

The part is approximately 4-in.



Carbide cutting tool completes a finishing pass (left) as gundrill enters (right) to work inside diameter. Insert shows closeup of gundrilling head.

diam and 31-in. long; it is of 30,000 tensile, centrifugally cast iron with a heavy scale. Once the casting is chucked on the lathe, the entire piece is rough and finish machined, both inside and out. An exception to this is 5-in. on one end needed for chucking.

Steps carried out

The operation includes roughing and finishing the outside, cutting one 8-pitch V-thread, one 16-pitch buttress thread, and gundrilling and burnishing the bore the entire length of the part. While gundrilling, the outside diameter is finish machined and a 16-pitch buttress thread is put in part of the outside diameter.

The threading covers about 8-in. length. This is done with Carboloy

grade 883 carbide tools mounted on a rotating indexable mechanical holder. The fixture holds other carbide tools for previous finishing operations. Since the work rotates for gundrilling, the same speed (242-rpm) is used for finishing the part, and to generate the 0.015-in. deep buttress threads.

In gundrilling, the machine takes a Carboloy 883 carbide cutting tool. This includes a 15° cutting angle. The tool sets in the drill head at a 15° angle to keep the head pushed back against the opposite side of the internal diameter as the tool cuts.

After gundrilling, a roller burnishing tool running at 158-sfpm pushes through the bore. This sizes the hole and provides the proper finish for the part.

Integrated Setup Cleans And Stress Relieves Castings

By W. G. PATTON, Engineering Editor

◆ Burned-in sand or heat treat scale are conditions which cannot be tolerated in castings for automatic transmission casings . . . They play hob with machining and service life . . . Following up stress relief with electrochemical cleaning licks the problem.

◆ One large automatic transmission plant tied its stress-relieving furnace together with a Kolene salt bath . . . Combined operations are fully mechanized . . . The setup readies four 65-lb castings for machining every 1½ minutes.

◆ GRAY IRON castings for transmission cases roll through furnace stress-relieving and salt-bath cleaning operations—emerging ready for machining—at the rate of four every 1½ minutes, at Chrysler's new Kokomo, Ind., automatic transmission plant. Operations are fully automatic.

The furnace is probably the first of its kind using an exothermic atmosphere to prevent scaling of the work over weekends.

The 65-lb castings are noteworthy in several ways.

All Chrysler transmission castings are stabilized by a stress-relief heat treatment at 1140°F. This eliminates distortion during or after machining. Also, each transmission case is Kolene-cleaned, to remove burned-in sand or iron oxide that might break loose later and foul up the valving system. The Kolene treatment also helps inspection, making it possible to find defective castings before valuable machine hours have been wasted.

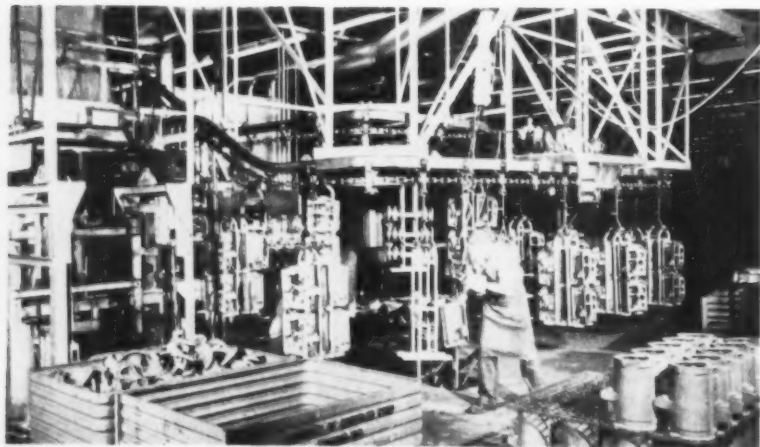
Sometimes, castings are given the cleaning treatment just to improve machining.

Tying in the stress-relief furnace heat treatment with the salt bath cleaning has resulted in a system which (1) is entirely mechanized, (2) involves two cross-transfers of castings, (3) permits loading and unloading of conveyors and of the furnace and the cleaning unit with only one initial manual assist and, (4) permits sludge removal from the bath without interfering with the operating cycle.

Considered maintenance

The Holcroft furnace is designed to permit annealing at 1500°F as well as stress-relieving, should annealing be necessary.

Preventive maintenance was given considerable attention in planning the new units. Careful study also went into choice of elec-



OPERATOR loads automatic transmission castings onto conveyor, four per fixture, at start of operations. Other handling through furnace (left) and Kolene Unit (right) is automatic.

trical gear and accessibility of heating units. In the cleaning units, all heating facilities are on one side of the bath where they are readily accessible.

With drainage problems in mind, Chrysler transmission castings were designed with several extra cored holes to simplify draining. This reduces dragout from the Kolene and rinse tanks, and no tilting or agitation of the castings is required.

Transfer to trays

Castings get one manual assist on starting, an operator loading them onto a conveyor, four castings per fixture. The loaded conveyor loops back in phase with another conveyor bringing empty trays back to the transfer point.

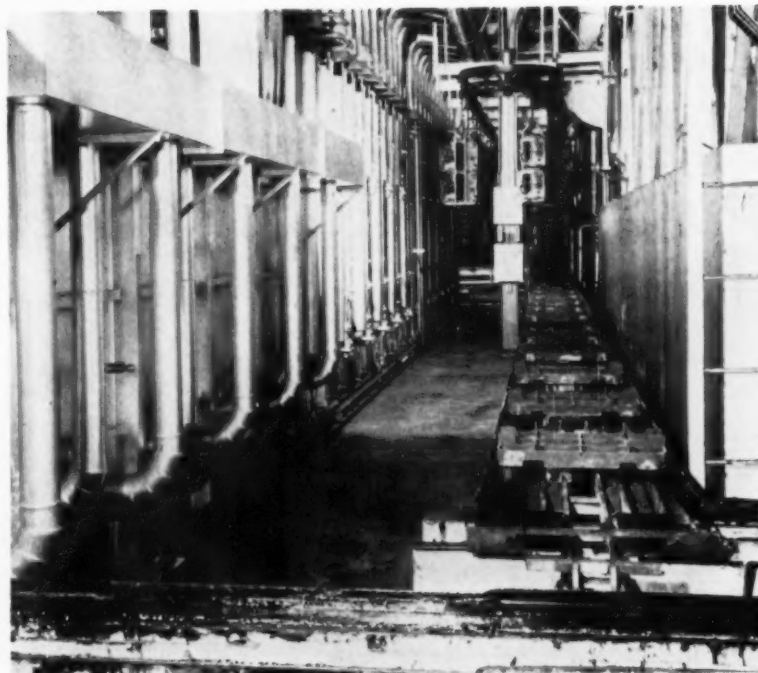
The loaded fixtures are picked off the conveyor automatically and transferred to special heat-resisting trays, in preparation for heat treating. Next, loaded trays are indexed over one position until three of them are lined up. A chain drive then moves the three fixtures into position in front of the furnace door. The door then opens, a screw-type pusher moves the trays into the furnace, and the door closes automatically.

The Holcroft furnace is a three-row pusher, radiant-tube heated type, with tray return operating in conjunction with the salt cleaning bath. Capacity is 160 transmission cases.

This rating is based on loading four cases in a fixture on a 15 x 22 in. tray. It allows for 3 hours in the heating chamber and 1.2 hours in the cooling chamber. Maximum temperature is 1500°F. Overall furnace dimensions are 18 ft wide, 87 ft long and 12 ft high. Heating chamber is 50 ft, 8 in. long. Cooling section is 21 ft, 3 in. long.

There are 56 trays per row, or a total of 168 trays in the furnace. Push rate is 12 cases per push; one every 4½ minutes.

Forty-eight gas-fired Holcroft, closed-head-design radiant tube burners heat the furnace. These are controlled in four zones. Stock is cooled by 20 air-cooled tubes. Six ball-bearing screw pushers push trays into the vestibule. Movement of trays from the furnace at the discharge end, and return to the



CONVEYOR-HELD castings loop around between furnace (left) and salt bath, then come back for automatic pick-off and transfer to furnace conveyor. Stress relieving temperature is 1140°F.

charge end, is fully automatic. Trays position automatically at the unloading point.

A 10,000 cfh exothermic gas generator supplies atmosphere gas. Analysis is 10.6 pct CO₂, 1.1 pct CO, and 1.8 pct O₂.

Although the furnace is designed for a maximum operating temperature of 1500°F, annealing is at lower temperatures, depending on the hardness of the green castings.

Furnace time's 5 hours

Time in the furnace is approximately 5 hr. The trays transfer automatically then to the Kolene line, which is adjacent to and parallel with the furnace.

Fixtures with their loads of four castings each are picked off the trays automatically and swing into the cleaning bath held at 600°F. The salt pot is 32 ft long. Four propeller agitators keep the salt circulating so that sludge will not settle out in the working area. At the same time, the forced circulation of the salt also improves heating efficiency.

During operations, a small amount of the circulating salt constantly by-passes into an unagitated

settling area. This slows down the movement of the salt and permits the sludge to settle out on four removable trays. Flow of the salt into the 42 x 48 in. settling areas of the cleaning unit is controlled by an adjustable gate.

Circulating a part of the salt to permit sludge settling is a 5-year development of the Kolene Corp., and has been used successfully on a number of installations.

Following cleaning, fixtures transfer the castings automatically into a cold rinse tank, where they are cooled to room temperature. A hot water rinse follows. Castings are then lifted free of the rinse tanks and transferred to a conveyor which carries them back to the original loading position. There they stop. Within a few seconds, with the aid of an air lift, lowers each casting carefully onto a roller conveyor.

This moves the castings, by gravity, a distance of about 10 ft. There they stop. Within a few seconds, they are picked up automatically by a monorail conveyor and transferred to the machining department, ready to undergo further processing.

Free-Floating Grinders Put Smooth Surface On Wire

♦ TITANIUM'S appetite for contaminants posed a problem for wire manufacturers. It is readily embrittled by even minute quantities of oxygen, nitrogen, hydrogen and carbon. Since any surface contaminant possesses these elements in greater or lesser amounts, the producers were continually harassed.

Mechanical cleaning with a new production technique successfully removes contaminants from titanium welding wire. It turns out clean, highly ductile, ultra-smooth surfaced material.

A machine with free-floating grinding wheels does the job for Johnston & Funk Titanium Corp., Wooster, Ohio. The titanium stock is grit-blasted before leaving the machine to be drawn.

Initially, the answer seemed to be careful descaling and pickling. This proved inadequate. During hot rolling of ingot to rod, laps or seams containing oxides frequently develop in the rod. These could not be cleaned entirely out of the tightly closed seams by pickling and descaling. The seams provided natural reservoirs for trapping drawing lubricant. Moreover, hydrogen gas was sometimes picked up during pickling.

Tried mechanical means

That's when the makers tried mechanical means. Starting from scratch, they built a machine that removes the laps and seams. A series of free-floating grinding wheels bear on the stock's surface as it feeds through the unit.

The wheels align parallel to the rod; this keeps all abrasion marks longitudinal. Perpendicular marks can lead to breakage during drawing operations, causing early fatigue from stress concentrations at these points.

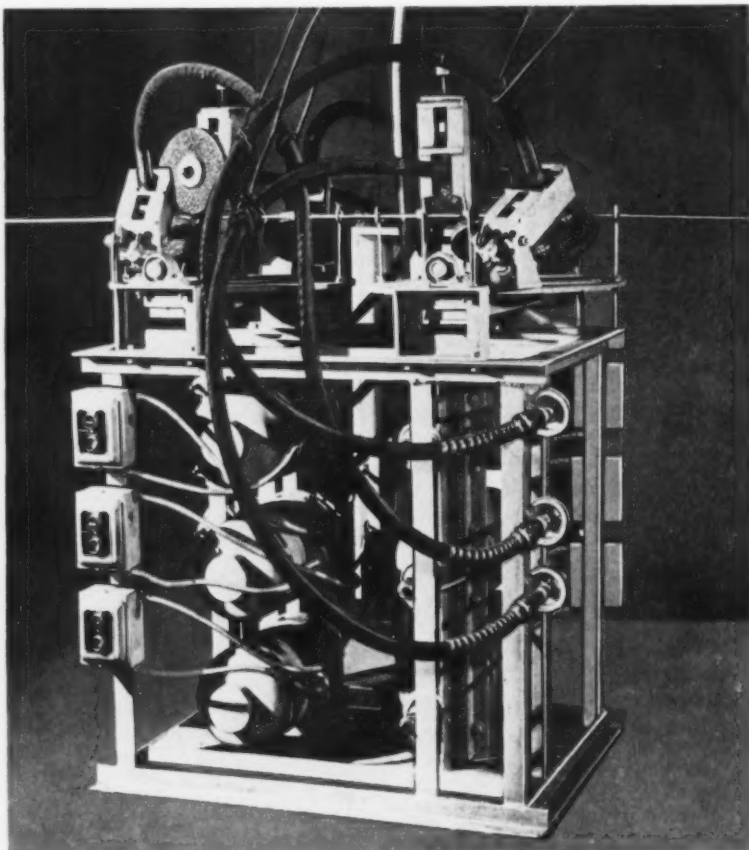
Measuring about 10-in. diam, the wheels are grooved slightly so that each wheel covers about 60° of the rod's circumference. Six wheels cover the full circumference. Some burning of the surface was experienced during early experimentation, but a balance between wheel speed, pressure and rod speed was established, eliminating surface burning of the rod.

The machine will remove any amount from the surface of the rod. However, grinding about 0.020-in. from the diameter results in clean,

seam-proof stock in most cases. This usually has excellent longitudinal as well as transverse ductility.

Metallographic examination of the cross-section of the stock aids in adjusting the grinding unit. It also helps in inspection of the coil after the operation.

As a final step in avoiding the danger of hydrogen contamination during cleaning, the titanium stock is exposed to grit blasting before leaving the machine for a subsequent drawing operation.



MECHANICAL SURFACE CLEANER uses free-floating grinding wheels. These bear on the titanium's surface as it feeds through the unit.

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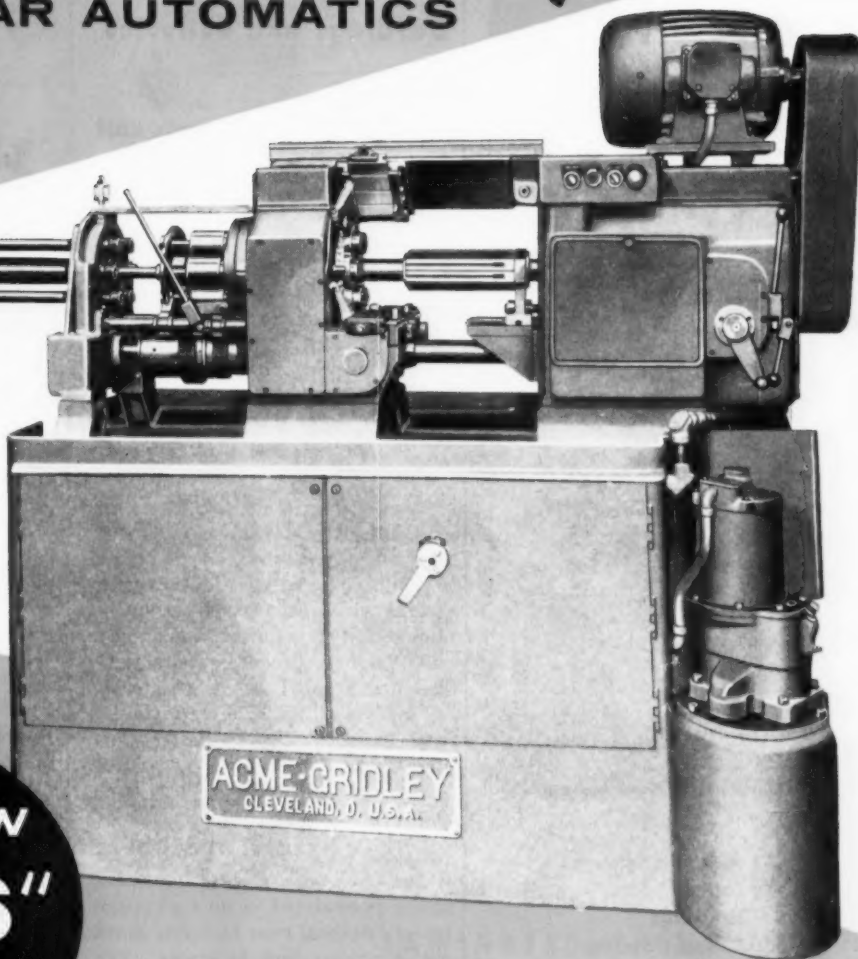
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New Technical Literature:

Catalogs and Bulletins

Inclining press unit

Fast-acting, an air motor inclining device available as optional equipment on open back inclinable presses (45 to 200 ton models) is illustrated in a new bulletin supplement. Clearly described is a simple, safe, air motor mechanism that inclines or brings the press upright over a full 30° range in approximately two minutes. *Niagara Machine & Tool Works.*

For free copy circle No. 1 on postcard, p. 121

Grinding rods

A four-page brochure describes Diamonite grinding rods for fast grinding, long service and low cost. It tells what the product is, why it allows faster grinding and longer life and how it solves contamination problems. Two case histories are presented in brief. *Diamonite Products Div., United States Ceramic Tile Co.*

For free copy circle No. 2 on postcard, p. 121

Water treatment

Automation of water treatment plants is analyzed in an eight-page folder. Several case histories point out problems and solutions. The article presents, in addition to many illustrations, a chart of the various types of demineralizers available, their application and advantages. *Graver Water Conditioning Co.*

For free copy circle No. 3 on postcard, p. 121

Valves

Newly revised, a guide for selecting valves, boiler mountings and lubricating devices is now available. Sections describe new bronze globe valves, with Brinallloy seats and discs; all-molded valves resistant to industrial chemicals; and solder end valves. *Lunkenheimer Co.*

For free copy circle No. 4 on postcard, p. 121

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 121.

Aircraft switches

"Basic Switches for Airborne Equipment," contains 32 pages illustrating phenolic encased aircraft switches, metal-covered hermetically sealed switches and high-temperature switches. *Micro Switch Div., Minneapolis-Honeywell Regulator Co.*

For free copy circle No. 5 on postcard, p. 121

Smoke indicators

Improved smoke indicators and indicator-recorders are described in a four-page illustrated bulletin. The indicator's case is designed for either flush or surface mounting. A red and green warning light as well as a 4½ in. smoke meter are provided. Warning lights indicate to the boiler operator that the smoke is out of bounds; the large smoke meter indicates the color of flue gas at all times. *Brooke Engineering Co., Inc.*

For free copy circle No. 6 on postcard, p. 121

Permanent magnets

Reporting an extremely high energy product, a new bulletin looks into the advantages and limitations of a new permanent magnet alloy. It describes Alnico 5Cb, including its physical properties and a typical demagnetization and energy product curve. It also contains a description of the comparative properties of all standard permanent magnet materials made by the company. *Thomas & Skinner, Inc.*

For free copy circle No. 7 on postcard, p. 121

Machinists' vises

Machinists' vises, special purpose vises, and utility vises are listed in a six-page folder. It presents replacement parts for vises and pictures eight basic models made by the manufacturer, *Reed Mfg. Co.*

For free copy circle No. 8 on postcard, p. 121

Compressed air

Various techniques using compressed air for fastening, capping, sealing, drilling, driving tools, etc. are discussed in an idea-sheet. Several case histories involving riveters, Keller tools, hammers, assembly, hole cutting and uncapping containers are reviewed. *Gardner-Denver Co.*

For free copy circle No. 9 on postcard, p. 121

Rust prevention

More than a catalog, a 1957 coatings manual is actually a treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. It features the results of over two years of intensive research in areas where conditions of excessive moisture, salt spray, fumes, gases, weather, and other rust-producing agents are severe. This comprehensive, easy-to-understand 32-page full-color manual provides over 100 actual color "chip" samples of primers and finishes. *Rust-Oleum Corp.*

For free copy circle No. 10 on postcard, p. 121

Pumps

Versatile centrifugal pumps are subjects of a six-page brochure. These pumps are ruggedly built to withstand continuous duty. They are powered by standard end mounted 3459-rpm ball-bearing motors. Single phase motors are of the capacitor type, 1½-hp and smaller with built-in overload protection. They can be furnished with single or three-phase motors or can be belt driven. A closed bronze impeller is accurately balanced; a removable bronze wearing ring is economically replaced. Its stainless steel pump shaft stubbornly resists corrosion, it states. *The F. E. Myers & Bro. Co.*

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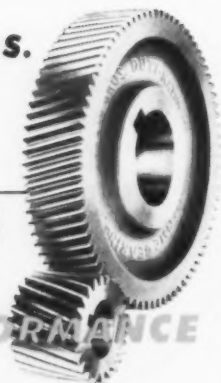
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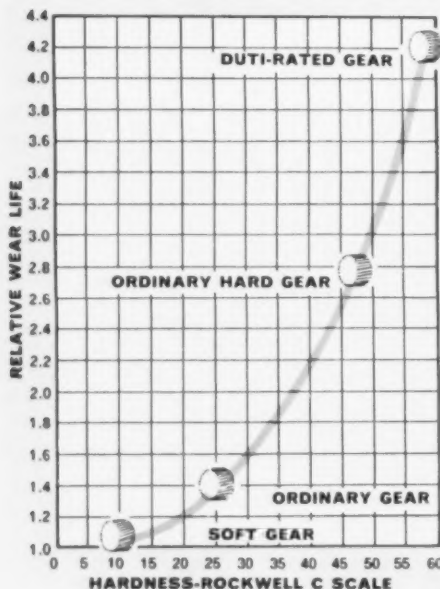
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FREE LITERATURE

Turret punch presses

Turret punch presses for piercing sheet metal and plate in short to medium production quantities are covered in a bulletin now obtainable. It includes specifications and information on all presses from hand-operated to 150 ton capacity models. *Wiedemann Machine Co.*

For free copy circle No. 12 on postcard, p. 121

Automatic drives

Advantages of torque converter drive for lift trucks are described in new specification sheets. This transmission, the sheets explain, is available as optional equipment on a manufacturer's new 3000, 4000 and 5000-lb capacity trucks. The torque converter allows "inching" control which results in high performance; this allows combined "inching" and raising of load at full lifting speed. It eliminates low-high gear shifting and speeds forward-reverse shifting. *Hyster Co.*

For free copy circle No. 13 on postcard, p. 121

Centerless grinding

In centerless grinding, an adequate selection of work blades and guides is just as necessary as expendable accessory equipment for other types of machine tools. With this thought in mind, a machine-tool firm prepared a new and comprehensive catalog of "Work Blades and Guides" for centerless grinding and lapping machines. *The Cincinnati Milling Machine Co.*

For free copy circle No. 14 on postcard, p. 121

Hole-makers

Hole-making tools with self-cleaning action are described in written matter now obtainable. They are high-production tools, operating like a conventional hole saw. However, the new units produce deep holes in flat, thick plate, or on curved cylindrical pieces. They mill through-holes in stock as thick as 3/4-in. in some tool sizes. They cut much faster than conventional saws, use automatic feeds on various machines, go completely through stock in one pass without clearing chips and can work with alloy steels as well as low carbon. They can be resharpened. *Robert H. Clark Co.*

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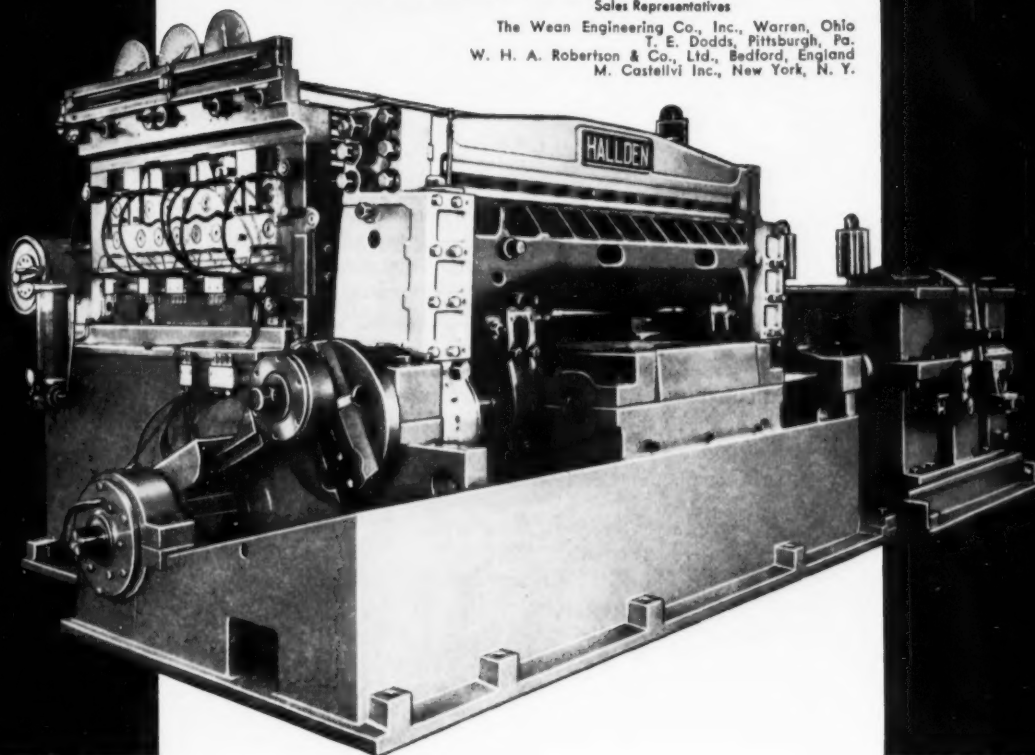
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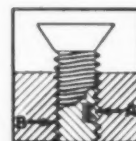
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FREE TECHNICAL LITERATURE

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This section starts on p. 116.

Dual spindle lathe

Two spindles; one lathe. That's what a new folder describes. The two-machines-in-one combination has dual swings over the bed of 40 and 60-in. The literature lists specifications and descriptions of the machine tool's components. A 23-in. photograph illustrates the equipment. *The Boye & Emmes Machine Tool Co.*

For free copy circle No. 16 on postcard.

Rebuilt machine tools

Containing 44-pages, a new catalog lists guaranteed rebuilt machine tools. With few exceptions, these are located in their warehouses. Quite a few are completely rebuilt; others are on the shop floor in the process of being rebuilt; others were in such good condition that they did not require rebuilding. Included in the listings are about 1000 machines from automatics to welders. *Miles Machinery Co.*

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Handling careers

"Career Opportunities in Material Handling" tells those who are interested in a material handling career what steps to take if they are now in college, in high school or employed in industry. It presents the types of career opportunities available with material handling equipment manufacturers, users, the government, distributors and manufacturers' agents, consulting firms, and colleges. Other educational material and a list of who to contact concerning career opportunities appears. *The Material Handling Institute, Inc.*

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Apprenticeship

A popularly written, illustrated booklet describes the national apprenticeship program. The 32-page booklet explains the program's aims, organization, and operation. *Publications Branch, Bureau of Apprenticeship, U. S. Dept. of Labor.*

For free copy circle No. 19 on postcard

Iron-powder electrodes

Iron-powder electrodes' success in the welding industry, their performance, and AWS specifications are covered in a recently announced folder. Technical data not alone presents welding performance of iron-powder electrodes, but it also gives data on iron powder used for coating the rods. *Hoeganaes Sponge Iron Corp.*

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Magnesium truck

Four-wheel magnesium trucks are thoroughly presented in 10 new bulletins. They offer descriptions and specification data on platform trucks, trailer trucks, box trucks, and towveyor trucks, among other models in the line. *Magline, Inc.*

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Air compressors

A 20-page catalog covers 1/3 to 20-hp air compressors for industrial use. Well illustrated, it offers specifications on single and two-stage models, portable models, tanks, pumps, and accessories. Useful charts, data, and information on compressed air are also included. *American Brake Shoe Co.*

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FREE TECHNICAL LITERATURE

Molded rubber parts

Custom-molded rubber parts and various creative phases are covered in an eight-page pamphlet. The latter include: engineering consultation, compound selection, mold design and manufacture. Technical specifications contain a description of relative properties of natural and synthetic rubbers. *Tyer Rubber Co.*

For free copy circle No. 23 on postcard

Powdered parts

Performance can go up and costs go down by replacing machined or assembled parts with powdered metal parts. So states a brochure just issued. Clearly outlined are the care and precision demanded in manufacturing powdered metal parts, plus their inherent advantages. One of these is substantial savings when small, close tolerance components are required in quantity. *Powdered Metal Parts Div., Lux Clock Mfg. Co.*

For free copy circle No. 24 on postcard

Heating elements

How heat problems are solved by using sprayed-on heating elements is dealt with in new literature presently obtainable. It describes the element as lightweight, thin and suitable for contour shapes and flat surfaces. The reading matter contains a history of an actual application and lists physical characteristics. The sprayed-on elements withstand considerable vibration, are abrasion resistant. They adhere to all metals and are anti-nutrient to fungus. *Electrofilm, Inc.*

For free copy circle No. 25 on postcard

Trucks, dock boards

Aluminum hand trucks and dock boards are pictured and described in a four-page folder. The trucks have a formed aluminum deck with rounded corners and an adjustable wheelbase for a short or long turning radius. This radius adjustment permits the truck to turn on its own axis. Trucks come in widths from 24 to 40-in. and lengths 36 to 72-in. with capacities to 2000-lb. *Voltz Brothers, Inc.*

For free copy circle No. 26 on postcard

Packaging

Custom-engineered interior packaging for industrial applications is discussed in a brochure now offered. It shows examples of savings and results achieved by bulk shippers using low-cost, light-weight interiors instead of heavier, high-cost substances. *Paper-Wood Specialties Co.*

For free copy circle No. 27 on postcard

Screwed fittings

No longer is there any reason to get mixed up trying to draw up an order for packaged screwed fittings. With a simple slide rule-like calculator, large quantities of one company's packaged fittings can be ordered by the carton as easily as in the old unpackaged days. The device, called a "Screwed Fittings Package Calculator," makes light work out of ordering large quantities of fittings by the carton. *Crane Co.*

For free copy circle No. 28 on postcard

Flow-coating finishes

New flow-coating finishes broadly extend the practical area of the flow-coating technique, according to a brochure being offered. These materials successfully finish objects with large areas and long flow. They provide instantaneous bubble release and "hang" well on sharp edges and holes, requiring only a short time in the solvent chamber and a minimum of supplemental spray. *Interchemical Corp.*

For free copy circle No. 29 on postcard

Gaging fasteners

Many receiving inspection departments in industry are unwittingly accepting oversize and undersize screw threads because they are not using the correct types of gaging to check pitch diameter. That's the conclusion of a new booklet. This, it states, can be avoided, though. It points out that two types of thread gages, a functional one for checking the high limit of tolerance and a pure pitch diameter type for checking the low limit of tolerance, must be used to provide a true indication of thread fit. *Standard Pressed Steel Co.*

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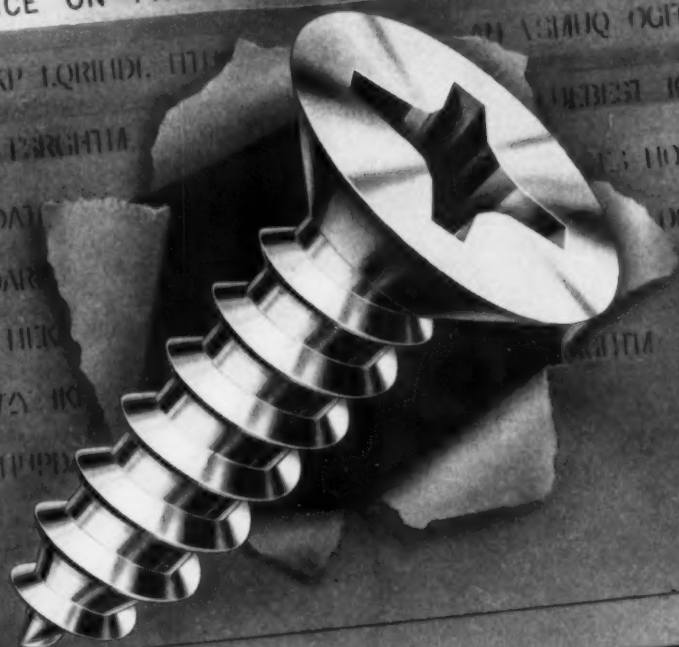


PROGRESSIVE-GRAM

DP 17 TO FASTENER BUYERS EVERYWHERE = TORRINGTON CONN =

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CUSTOMIZED SERVICE ON PHILLIPS HEAD SCREWS =



Now you can get from PROGRESSIVE Phillips Head Screws with an extra customized touch — Phillips Head Screws which are custom-made to your order. This means: (1) specifically made for you — not bin stock parts; (2) fast, custom-handling of every order; *plus* (3) the double economy of low initial cost *and* the savings in your assembly operations possible only with high precision, torsion-tested fasteners.

STANDARDS AND SPECIALS CUSTOMIZED FOR YOUR NEEDS

THE PROGRESSIVE MFG. CO.

Division of The Torrington Company
78 Norwood Street, Torrington, Connecticut

TRY THIS TEST ON YOUR PRODUCT'S LABEL



Coin test equals years of normal wear

Scrape a coin briskly over your product's name plate or decal. Chances are it will scratch the name plate or tear the decal right off. Not so with Metal-Cal.

Even under extreme conditions of temperature and abrasion, Metal-Cals remain bright and easy to read for years. Metal-Cal, the original aluminum foil applique, is made of .003 inch aluminum, backed with an amazing adhesive requiring no screws, pins, rivets or heat for normal application.

And the eye appeal of Metal-Cal's shiny or matte aluminum finish plus a choice of deep, rich colors... anodized, dyed and etched right into the metal, is a real sales tool in itself.

Try the coin test today. See if your present label measures up to the permanent, long wearing beauty of a low cost Metal-Cal.

Metal-Cal®

METAL-CAL Dept. 1A

Manufactured by C&H Supply Co.
415 E. Beach Ave., Inglewood 3, Calif.

I am interested in Metal-Cals

Name

Company

Street

City Zone State

U. S. Patent 2769263

TECHNICAL BRIEFS

HANDLING: Aluminum Foil

Easily damaged aluminum foil rolls are no longer easily damaged . . . Packing them in a novel box makes bruised items a thing of the past . . . It cuts shipping costs, too.

Easily damaged aluminum foil rolls are no longer easily damaged in shipment, thanks to a new packing technique.

Cochran Foil Co., Louisville, solves the tricky problem by shipping a pack of six rolls weighing 1800 lb in a wirebound box. Shipping weight of the pack is only 1900 lb.



Rolls' core ends rest neatly into notches in the box.

Over-all packing costs dropped from a third to a half when the firm converted to these boxes, they report. Damage to rolls is practically eliminated. Moreover, considerable factory space is saved during storage of containers before they are used. Cochran's customers laud the packing method's ease, speed and safety in unpacking and storing.

Rolls of foil wrapped in heavy kraft paper, ready for shipment, are placed by a mandrel on racks and wheeled to the packing area. They are packed four, six or eight rolls to the wirebound box.

A typical foil box consists of a

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 121. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

one-piece, three section wirebound blank with parallel rows of end cleats to form channels, notched solid wood sections for each end, and the wirebound top.

The wirebound blank first folds to form the box's bottom and sides. Then, a notched solid wood section of the end slips into the cleat channel at either end. This fits across



Lift truck stacks multiple-unit foil boxes ceiling-high.

the bottom and holds the core ends of foil. The rolls, with their ends protected by insulating and filler material, are taken by mandrel from the rack. They lower into the box with the core ends in opposite

notches; each roll is suspended free.

When the bottom layer is packed, a solid wood section notched on both edges slips into the end cleat channels. This doubles as a hold-down piece and the resting place for the top layer of rolls. After all rolls are in place, the top-most solid wood section slides into place as a hold-down piece. A wirebound lid is secured with wire-loop fasteners to the blank's ends.

Only ten man-minutes are needed to pack a six-roll multiple pack.

Welding:

CO₂ setup plug-welds thousands of holes.

Another application of CO₂ welding has cropped up. This time it's being used in plug welding several steam jacketed stainless vessels involving thousands of stay bolts with 1-in. plug welds.

Cuts Reworking Need

After conducting numerous experiments, The Chicago Steel Tank Co., working with representatives of Hobart Brothers Co. and Liquid Carbonic Corp., finally decided to experiment with the plug welding technique. They finally adapted the active gas shielding consumable electrode welding process.

The experimenters discovered that a high degree of efficiency was obtained. Most important, they report, were increased metal deposition and penetration rates. These result from the low popping agitation type arc that is characteristic of welding grade carbon dioxide.

At the same time, the new method permits a large degree of operator control, minimizes need for rework, and gives a good appearance.

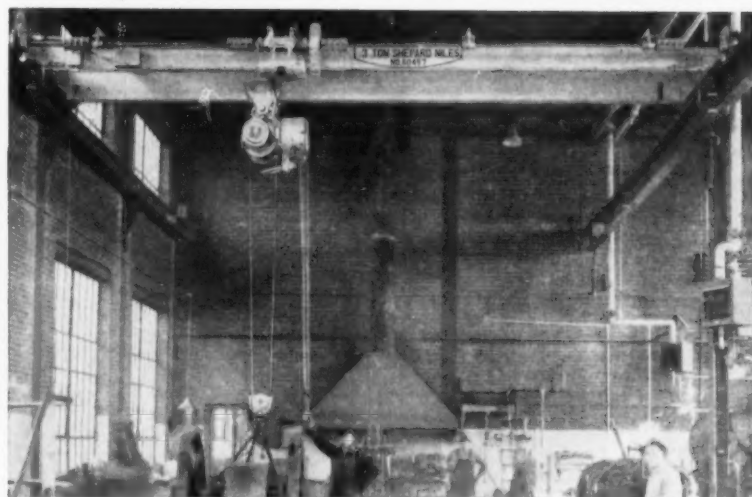
Arc Control Is Key

Since arc control is the key to quality on the job, the need to properly control spatter, weld bead, and consistency of penetration ruled out conventional welding equipment. The result: a constant voltage motor generator

SHEPARD NILES

CRANES

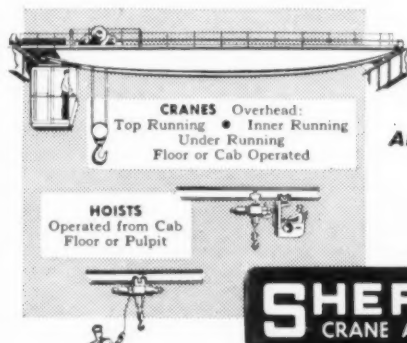
Over-running... Under-running... SINGLE BEAM CRANES



PERHAPS YOUR PLANT doesn't require a crane of double beam construction. Or possibly ceiling clearances would prevent its use. In either instance, a Shepard Niles Single Beam Crane might well be best for your use.

Shepard Niles Single Beam Cranes handle loads with precision, safety and at low operating cost. These cranes can be supplied with push button or pendant rope control for operation from floor, cab or remote location. Push-type or motor-driven trolley types of hoists, including close clearance units, are commonly employed on Single I-Beam Cranes.

Why not talk over your plant's load-handling requirements with an experienced Shepard Niles representative.



• Write today for latest Single Beam Crane Bulletin . . . and ask to have a representative call.

**America's Most Complete Line
of Cranes and Hoists
Since 1903**

SHEPARD NILES

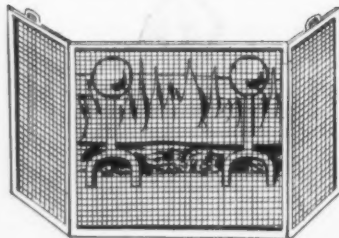
CRANE AND HOIST CORPORATION

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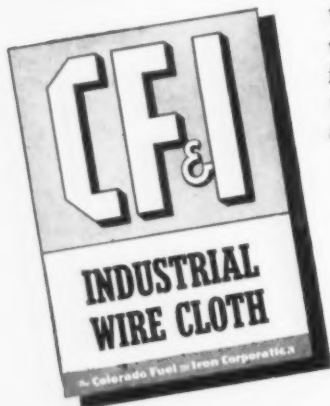
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you'll find...

CF&I INDUSTRIAL WIRE CLOTH

Versatility is another name for CF&I Industrial Wire Cloth. A special tinned version of it is used to gather lint in the manufacture of fine textiles. Another type is used to confine troublesome sparks to the safety of the fireplace. And chances are that you're using—or could be using—it to good advantage in your operation.



Why not get complete details on the wide variety of weaves, meshes and ferrous and non-ferrous metals in which CF&I Industrial Wire Cloth is available? Write today for Catalog.

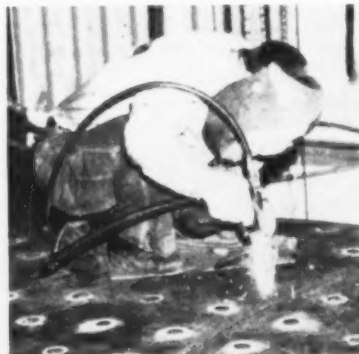
THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver
El Paso • Ft. Worth • Houston • Lincoln (Nebr.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo
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WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Toronto • Montreal

CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

TECHNICAL BRIEFS

power unit, a simplified constant speed wire feeding device, proper welding grade CO₂, regulating equipment, and a manual gun with a built-in fingertip control.



Operator uses CO₂ process for plug welding this vessel.

The best specification for this type operation proved to be 35-cu ft per hour of carbon dioxide. They used a speed of 500-ipm of an approved type CO₂ electrode with an arc voltage of about 42-v at a level of 400-amp.

Heat Treating:

**Roller-hearth furnace
handles 100-ft extrusions.**

Several separate operations in heat treating large aluminum-alloy extrusions are eliminated in a new application of a roller-hearth furnace.

Before installing the furnace, extrusion heat-treating operations at the Halethorpe, Md., plant of Kaiser Aluminum Co. were handled in vertical furnaces, over vertical quenching pits. This meant that each extrusion had to be separately handled by hoists and cranes in lowering the piece into the quench and hoisting it into the furnace.

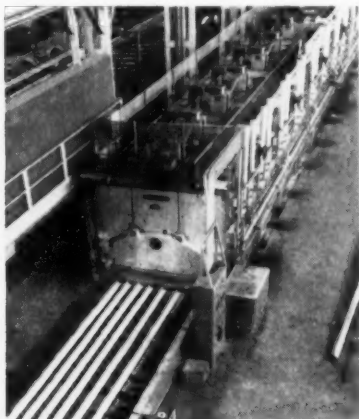
With the new roller-hearth furnace, extrusions come to a 103-ft charging table by conveyor. Charge doors raise automatically and extrusions go into the 112-ft furnace at the rate of 50-fpm.

The furnace itself has a maximum operating temperature of 1000°F. It has a total rating of

7.5-million Btu per hour. During the heating cycle the furnace rolls oscillate.

After the necessary heating and soaking time has elapsed, discharge doors open, and the extrusions pass through a 45-ft quench spray. They pass on to the 104-ft runout table.

The heat-treating furnace is capable of handling extrusions up to 100 ft long.



This furnace handles extrusions up to 100-ft long.

Heat-treating time is about half that necessary in the vertical furnace used previously. Also, mechanical properties of the material, such as yield strength, are reported as equal or higher than those obtained on the vertical furnace.

Steelmaking:

Card-programmed control runs roughing mill.

Card-programmed preset controls presently operate a reversing roughing mill at Allegheny Ludlum Steel Corp.'s, Brackenridge, Pa., works.

Setup Uses Electronic Counter

The control, developed by General Electric Co., aids in the production of electrical steels. The setup handles 15 programmed passes from a single card at accuracies of approximately 1/100-in.

The system utilizes an electronic

BEATTY GUILLOTINE BEAM PUNCH GAINS IN POPULARITY

Typical reports pouring in from all over the United States and Canada indicate machine's efficiency and accuracy:

"We have estimated our savings at 75 percent with our new No. 9 Guillotine Beam Punch — thanks to BEATTY."

"Our Guillotine Beam Punch and Structural Spacing Table eliminate hole layout, boost press output 50 percent per man-hour, save 25 percent floor space and spot holes more accurately."

"We appreciate the efficiency achieved with the No. 9 Guillotine Punch. We could hardly get along without this Punch as we do a lot of work with it at a nominal cost."

"Since we are more than satisfied with the performance of your No. 9 Punch and Spacing Table, can you furnish a similar Table for one of our other Punches?"

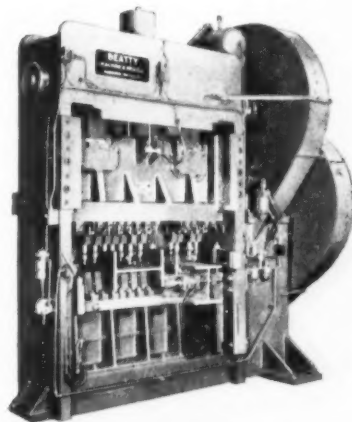
PRODUCTION GIANT REQUIRES LESS FLOOR SPACE

Ideal machines for punching flanges and webs of beams, Beatty Guillotine Beam Punches require less floor space, offer lower first cost and extreme rigidity. Large die space, clear working space and two-point application of force to the ram affords full capacity loading and punching across the face of the ram.

200-ton Model 9, illustrated, for beams up to 30", punches all holes in web of 30" beam. 150 and 350 ton models also available.

Write For Full Details

BEATTY MACHINE & MFG. CO.
936 150th St., HAMMOND, IND.



counter, preset by punched card data, to regulate the screwdown position. It measures feedback by pulses from a magnetic pickup-toothed disc transducer; this then compares with the preset value. The error in position is converted to a proportional signal which drives the screwdown control. The maximum opening is 9.99-in. with settings provided at intervals of 0.01-in. Maximum screwdown speed is 40-ipm.

The equipment uses 13 vacuum tubes, 25 transistors, and two amplifiers in addition to the customary voltage control for the 150-hp mill-type motor.

No Manual Adjustment

The new control eliminates manual adjustment; the system itself controls the setting and speed of the rolls. Once the proper card has been inserted into the card reader, a pressed button actuates the mill. As a result, rolls are positioned accurately. It eliminates variations in performance due to different operators. This makes possible more uniform steel quality.

The use of punched cards enables the operator to maintain on file a large number of schedules for a wide variety of products. It also permits a rapid change from one schedule to the next.

Although the initial application of the control is on a reversing roughing mill, General Electric engineers say it can also be applied to blooming, slabbing, and cold rolling mills.

Alloys:

Microdrill aids probers of alloy inclusions.

Seeking perfection in the alloys they develop, metallurgists dislike the tiny foreign bodies that show up along grain boundaries or within a crystal itself. They call these "inclusions." With all the painstaking care that is given to preparation of alloys with definite percentage compositions, the source of these impurities has always been difficult to run down. The size of the inclusion has been

partly responsible since some of the smallest run between three and five mils in diameter.

Use Spectrographic Analysis

Using a commercially available instrument with a power-operated drill only one mil in diameter, metallurgists in the Westinghouse Materials Engineering Dept. now remove samples of the inclusion for analysis on their emission spectrograph. This analysis method burns the sample under



Metallurgist removes an inclusion sample with a 1-mil drill.

high voltage. In turn, it releases from the sample radiation characteristics of the elements present within it. They record these characteristics on film. Here, they are later picked off and converted into percentages of certain elements.

If the inclusion is large enough and not too hard, the tiny micro-drill drives directly into the material; the resulting cuttings are used for analysis. However, if the inclusion is extremely small or intensely hard, then it becomes a matter of drilling a series of holes around the inclusion and actually lifting it out of its surroundings in the base metal.

Process Proves Valuable

So far, the process has proved quite valuable. For example, black inclusions were appearing in the welds of silver plated bus bars. When no metallic elements were found after analyzing a sample of the black material, engineers con-



MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES

The American Laundry Machinery Co., Rochester, N. Y.
Atlas Foundry Co., Detroit, Mich.
Banner Iron Works, St. Louis, Mo.
Barnett Foundry & Machine Co., Irvington, N. J.
Blackmer Pump Co., Grand Rapids, Mich.
Centrifugally Cast Products Div., The Shenango Furnace Co., Dover, Ohio
Compton Foundry, Compton, Calif.
Continental Gin Co., Birmingham, Ala.
The Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co., Portland, Ore.
DeLaval Steam Turbine Co., Trenton, N. J.
Empire Pattern & Foundry Co., Tulsa, Okla.
Florence Pipe Foundry & Machine Co., Florence, N. J.
Fulton Foundry & Machines Co., Inc., Cleveland, Ohio
General Foundry & Mfg. Co., Flint, Mich.
Georgia Iron Works, Augusta, Ga.
Greenlee Foundry Co., Chicago, Ill.
The Hamilton Foundry & Machine Co., Hamilton, Ohio
Hardinge Company, Inc., New York, N. Y.
Hardinge Manufacturing Co., York, Pa.
Jolintone Foundries, Inc., Grove City, Pa.
Kanawha Manufacturing Co., Charleston, W. Va.
Koehring Co., Milwaukee, Wis.
Lincoln Foundry Corp., Los Angeles, Calif.
Palmyra Foundry Co., Inc., Palmyra, N. J.
The Henry Perkins Co., Bridgewater, Mass.
Pohlman Foundry Co., Inc., Buffalo, N. Y.
The Prescott Co., Menominee, Michigan
Rosdale Foundry & Machine Co., Pittsburgh, Pa.
Ross-Meehan Foundries, Chattanooga, Tenn.
Smith Industries, Inc., Indianapolis, Ind.
Standard Foundry Co., Worcester, Mass.
The Stearns-Roger Mfg. Co., Denver, Colo.
Valley Iron Works, Inc., St. Paul, Minn.
Vulcan Foundry Co., Oakland, Calif.
Washington Iron Works, Seattle, Wash.
Dorr-Oliver-Long, Ltd., Orillia, Ontario
Hortley Foundry Div., London Concrete Machinery Co., Ltd., Branford, Ontario
Otis Elevator Co., Ltd., Hamilton, Ontario



**SEND FOR
FREE
BULLETIN**

"Casting Soundness Can Be Controlled"

Write today to Meehanite Metal Corporation, Dept. 1A, 714 North Avenue, New Rochelle, N. Y.

MEEHANITE®

THE IRON AGE

The tiny steel balls shown in the race ways of the Meehanite grinding plate are precision-made by the WINSTED BEARING COMPANY, Winsted, Connecticut.



Miniature steel balls are ground perfectly round on grinding plates cast in Meehanite metal

The fine grain structure and uniform solidity of Meehanite grinding plates enable the Winsted Bearing Company of Winsted, Connecticut to make miniature steel balls to the exacting requirements of the precision industries.

These exceptionally dense grinding plates, cast in quality controlled type "GA" Meehanite metal, provide long service life, maintain dimensional accuracy and can be heat treated without fear of distortion. In addition, Meehanite plates have high tensile strength (over 50,000 psi), high modulus of elasticity, low co-efficient of thermal expansion, excellent wear resistance and good machinability.

The tiny steel balls shown are used in miniature bearings, ball point pens and other precision instruments. They are made with the highest degree of uniformity and dependability. Each ball must be spherical within three to four millionths of an inch, can vary in size no more than five millionths of an inch and the surface finish must be better than half a micro-inch.

Meehanite grinding plates have been used by the Winsted Bearing Company for over six years with very satisfactory results.

If you would like more detailed information about the physical properties of Meehanite casting, write



Over 20,000 steel balls ground perfectly round on Meehanite grinding plates are held in the teaspoon. The hermetically sealed glass jars contain over 50,000 balls.

today for Bulletin AR-130 "Casting Soundness Can Be Controlled."

MEEHANITE BRIDGES THE GAP BETWEEN CAST IRON AND STEEL[®]

MEEHANITE METAL

MEEHANITE METAL CORPORATION, NEW ROCHELLE, NEW YORK

cluded that the material must be carbon. Checking back on the manufacturing process, they found that the bars were coated with wax; during the welding process, the material sputtered out leaving deposits of carbon in the weld. Specifications now require degreasing the bars before welding in order to insure better electrical conductivity and avoid stresses and cracks in the welds.

In another welding operation,

spectrographic results of micro-drill filings showed the inclusion consisted of major iron and minor manganese concentrations. With definite elements to track down, engineers concluded that particles came from grinding wheels used in finishing the surfaces for welding. They took measures to eliminate this contamination. Again the elimination of these inclusions prevented stresses and cracks in the weld.

Inspection:

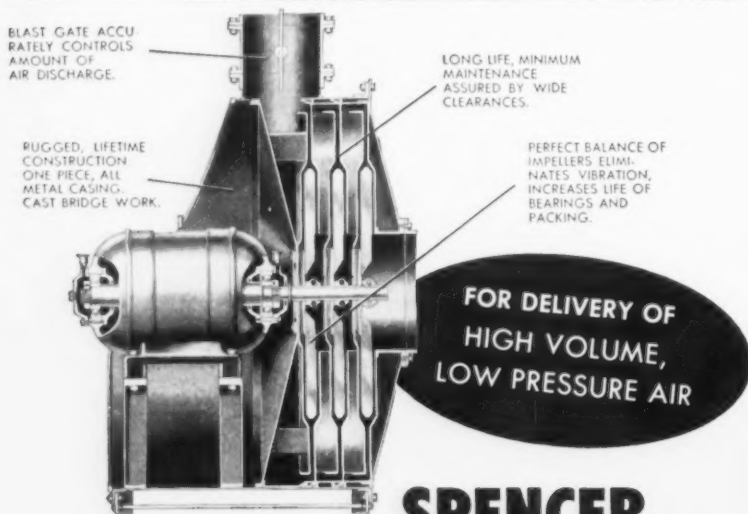
Tight checks hold ± 0.012 -in. tolerance on 37-in. diam.

In the production of fuel manifolds for jet engine main burners, a manufacturer jig-brazes 755 separate pieces, using 380 brazes, into a 37-in. diam assembly. Despite size and brazing difficulties, tolerance is 0.015 in. on the diameter.

The firm, National-U. S. Radiator Co., keeps this accuracy by tight control not only of the brazing, but also of the components and materials used.

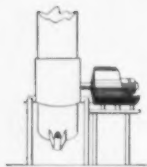
Type 347 Prevents Corrosion

Tubing for the manifold's "pig-tails" is 0.3125 in. OD seamless Inconel tubing supplied by Superior Tube Co., Norristown, Pa. Tube for the ferrules, to which the other tubing is brazed, is type 347. This is a columbium-bearing modification of type 304 stainless steel. It prevents carbide precipi-



SPENCER Turbo-Compressors are PREFERRED

by Equipment Manufacturers and for Replacement



CUPOLAS



ROLLING MILLS

You'll see Spencer "blowers" . . . with the familiar "sugar-scoop" design . . . on a wide variety of equipment in foundries and metal-working plants everywhere.

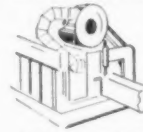
Performance is the reason. Experienced metals men know you just can't beat the rugged reliability, the proved-in-use performance of a Spencer Turbo.

Simple, built-to-last construction . . . mounting that requires no special foundation, no bolting down . . . discharge in any of eight positions . . . quiet operation . . . use of power proportional to amount of air used . . . these are a few of the reasons why SPENCER is preferred.

Capacities from 1/3 HP to 1,000 HP, up to 20,000 CFM, 4 oz. to 10 lbs. pressure.



ANNEALING FURNACES



CONVEYOR WASHERS



OTHER QUALITY
SPENCER PRODUCTS

The **SPENCER**
TURBINE COMPANY
HARTFORD 6, CONNECTICUT



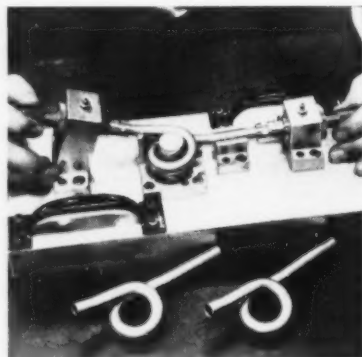
STATIONARY
VACUUM
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PORTABLE
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CLEANERS



PNEUMATIC
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SYSTEMS

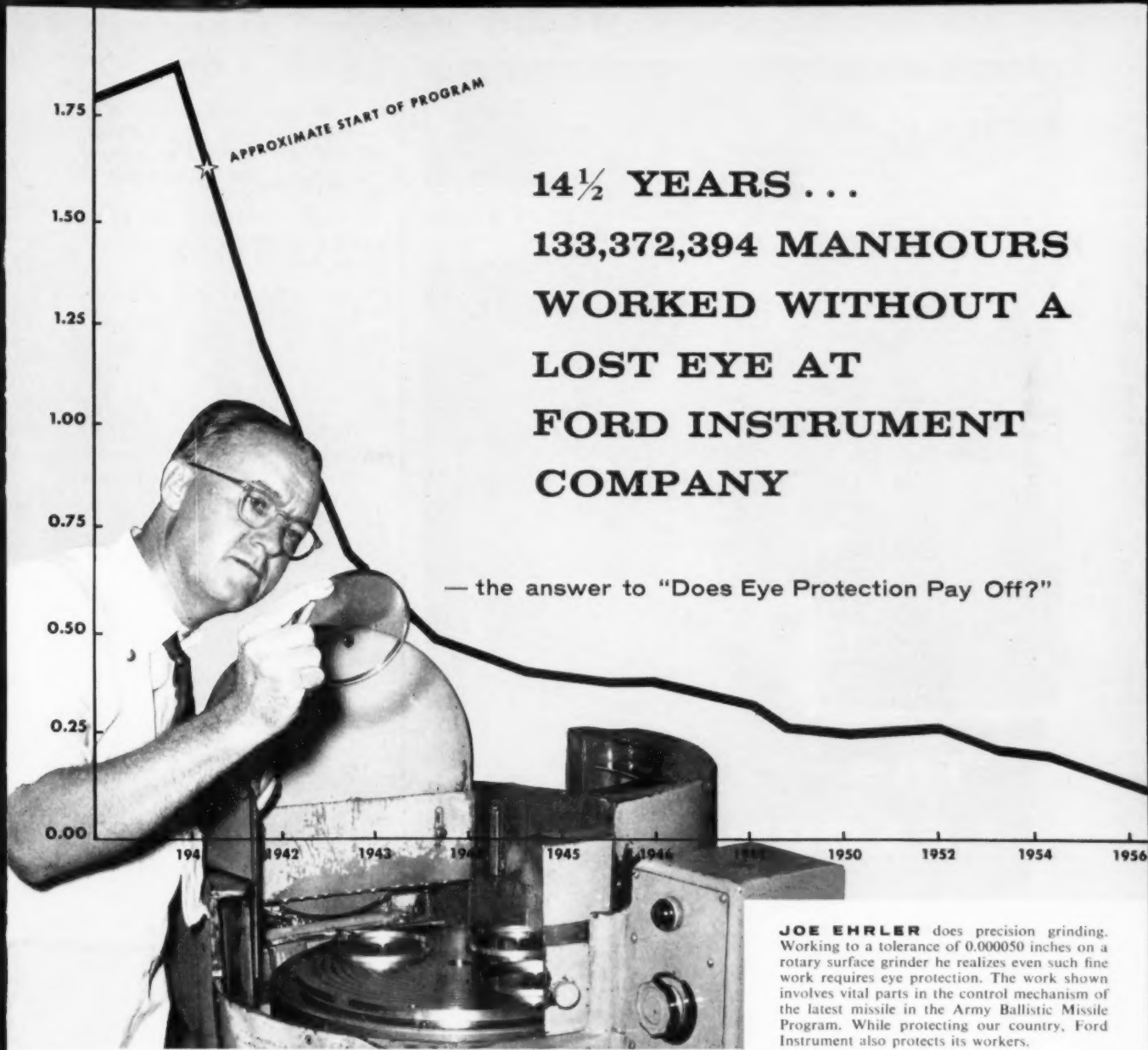


This fixture checks bent tubing for contour and diameter.

tation and intergranular corrosion when copper brazing the "pig-tails" to the ferrules before assembly into the manifold.

In producing the ferrules, a drill press first reams cut lengths to a slight shoulder on one end. Then, a contour saw cuts the other end to a 45° angle, with a few cut to a 35° angle. Tolerance on the angle is $\pm 2^\circ$. The cut angle is then deburred.

When ready to braze, a copper ring inserts into the ferrule and



14½ YEARS . . .

**133,372,394 MANHOURS
WORKED WITHOUT A
LOST EYE AT
FORD INSTRUMENT
COMPANY**

— the answer to "Does Eye Protection Pay Off?"

JOE EHRLER does precision grinding. Working to a tolerance of 0.000050 inches on a rotary surface grinder he realizes even such fine work requires eye protection. The work shown involves vital parts in the control mechanism of the latest missile in the Army Ballistic Missile Program. While protecting our country, Ford Instrument also protects its workers.

Mr. Gilbert F. Tyler, Safety Director, states, "At 11:30 P.M., January 17, 1942 a milling machine operator was standing in front of his machine when the cutting tool broke and a large piece entered his eye. The eye was lost. Several months before, three other eye cases resulted in the loss of sight.

"An intensive eye protection program was started and has been continued to the present with ever increasing effectiveness and with the use of American Optical products.

"During these 14½ years, Ford Instrument has experienced 133,372,394 manhours without a lost eye. During the last 5 years we have averaged one foreign body case per year of very minor nature. Under the voluntary educational system the operators are wearing eye protection equipment. In the last 10 months we have been practically accident-free of even the minor foreign body case."

The experience of Ford Instrument Company, Division of Sperry Rand Corporation, is typical. Cost of the injuries prior to the program was almost \$2.00 per employee in compensation alone. Cost of the injuries currently is less than 3¢ per employee. Whether you are in metalworking, the chemical industry or wherever eye accidents can be costly, it will pay you to get the facts.

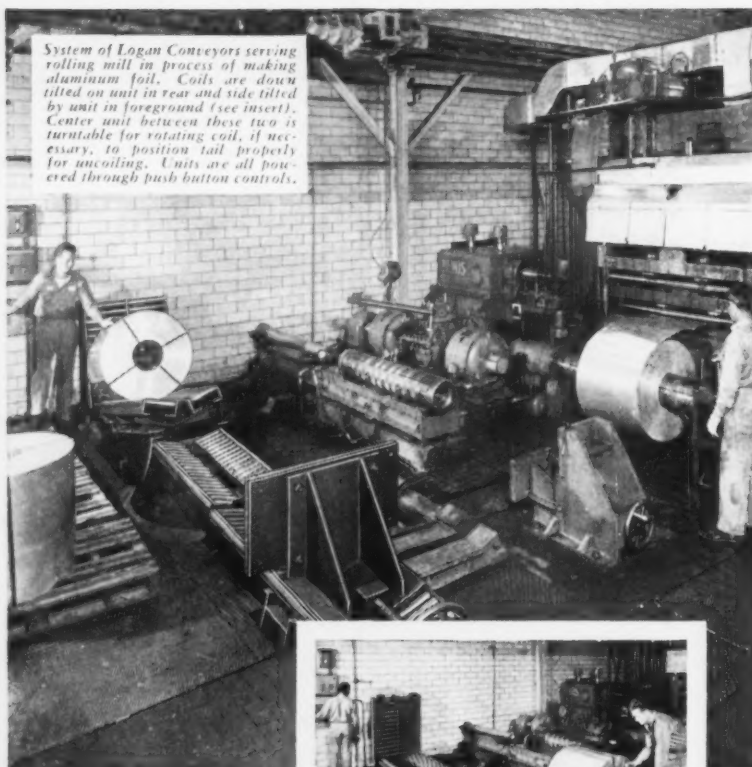


GILBERT F. TYLER, a leader in industrial safety, has been Safety Director for Ford Instrument Company, Division of Sperry Rand Corporation, since December 1952. His responsibility includes development and maintenance of an accident control program for the protection of personnel and plant facilities. He also acts as staff supervisor in safety problems, makes regular inspections and reviews methods, materials, machine guarding techniques and personal protective devices. He has contributed many articles on safety to national publications.

*Always Insist
on the AO
Trademark on
Lenses and Frames*

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE • MASSACHUSETTS
BRANCHES IN PRINCIPAL CITIES

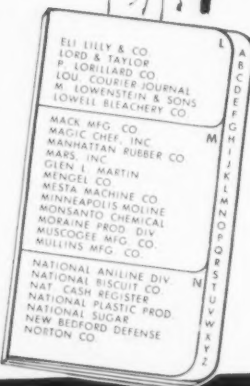


System of Logan Conveyors serving rolling mill in process of making aluminum foil. Coils are down tilted on unit in rear and side tilted by unit in foreground (see insert). Center unit between these two is turntable for rotating coil, if necessary, to position tail properly for uncoiling. Units are all powered through push button controls.

The LEADERS use Logan

Leadership, in the industrial world, is closely allied to the use of mass production equipment such as Logan Conveyors. Large plant or small, the "principles" of mass production can be utilized to advantage. Conserving manpower, saving priceless time, increasing plant capacity, maintaining satisfactory working conditions are some of the contributions which Logan Conveyors make to the mass production process. Let Logan work for you, too. Write for nearest engineer or for further information.

LOGAN CO., 545 CABEL ST., LOUISVILLE 6, KY.



Logan Conveyors

stops at the reamed shoulder. The ferrule slips over the "pig-tail," holding the copper ring against the shoulder, and the assembly is brazed.

Cutting one ferrule end at an angle distributes stresses and reduces possibility of fracture.

Inconel Cuts Vibration

The Inconel tube cuts into 12-in. lengths, ± 0.020 in. on the length, and then bends into the "pig-tail" shape. This helps absorb vibration and prevents fracture.

The company gives the first shipment of a heat of both Inconel and type 347 a complete chemical and mechanical check. In addition, inspectors examine type 347's micro-structure for carbon.

In subsequent shipments on the same heat, only important elements are analyzed.

Part of every length of tubing received is checked for diameter; samples of every shipment are gauged the entire length of the tube for diameter and wall thickness.

The "pig-tails" are checked 100 pct for length, contour, nicks, burrs, dirt and scratches. Each tube is also swaged. After inspection they are degreased and stored.

The finished ferrules are 100 pct inspected for ID, OD, length, angle, chamfer, burrs, heat number and part number. On machined parts, every tolerance is held to a maximum of 0.003 in.

Fixture Is Highly Accurate

The brazing fixture, in which the parts are rigidly clamped before brazing, weighs 1400 lb. It is machined as accurately as the parts themselves. It is made from stainless steel to get the same coefficient of expansion as for the stainless and Inconel parts used in the manifold.

For brazing tubes within tubes, National-U. S. Radiator uses bell type vacuum furnaces to purge out contamination from the smallest invisible cracks.

After brazing, the manifold is carefully checked for any defects and is placed in an acceptance fixture to test for size and configuration.

Foundry:

**Single operator removes
200-ton risers easily.**

Removing large risers in the foundry or steel mill has long been an expensive, time consuming operation. Early oxygen flame-cutting developments made the job a little easier and faster. Small risers were removed without too much trouble; heavier sections still presented a problem.

Cuts 55-in. Thick Steel

For many years Linde Air Products Co., a division of Union Carbide and Carbon Corp., worked with foundrymen to develop a



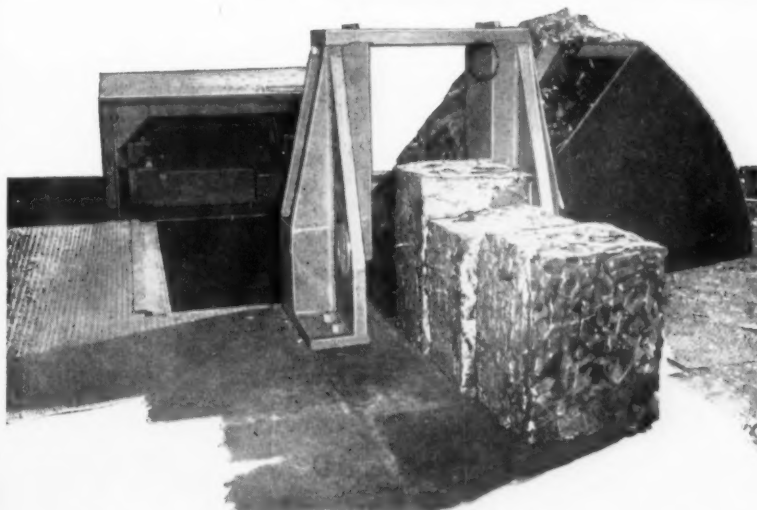
Cutter uses an oxygen blowpipe to remove a large riser.

manual flame-cutting blowpipe capable of penetrating extremely heavy sections of metal. Now, risers weighing between 20 and 400,000 lb are removed quickly by a single operator without moving the casting.

Cuts 55 in. In One Pass

A new blowpipe cuts through steel as thick as 55 in. in a single pass. Far greater thicknesses can be cut in multi-pass operations. The blowpipe applies a tremendous amount of preheat to the surface to be cut. It needs no auxiliary preheat. Separate hose lines for preheat and cutting oxygen make this possible.

consider the profit angle



... in salvaging and marketing your sheet metal scrap!

If your metal stamping or metal forming operations are generating sheet metal scrap in substantial volume — you have a disposal problem to solve.

In many plants the baling of sheet metal scrap has proved a highly profitable operation in the disposal process — resulting in such benefits as lower scrap handling costs, better use of floor space, increased production, higher average scrap prices.

Galland-Henning Hydraulic Baling Presses have been serving industry for many years in the low-cost salvaging of sheet metal scrap. If you are planning a new plant, the modernization or expansion of present facilities — the orderly baling of your sheet metal scrap is worth considering from the overall profit angle. Galland-Henning offers you competent counsel on this subject, without cost or obligation.

GALLAND-HENNING MFG. CO.

2725 S. 31st St., Milwaukee 46, Wisconsin

GALLAND-HENNING

SCRAP METAL BALING PRESSES

Something new has been added to the "Coffee Klatch"

The Silex Company, noted manufacturers of vacuum coffee-makers, selected Hendrick Perforated Metal to fabricate this popular two-unit coffee-casserole warmer. Hendrick Perforated Metal not only adds to a product's attractiveness but it increases its salability as well. You can select from hundreds of attractive designs in commercially rolled metals and gauges to suit your most exacting requirements. Available with round, square, diamond hexagonal or slotted perforations in plain or panel effects.



New
ARMSTRONG
Armide CARBIDE INSERT
TOOL HOLDERS

The advantages of Carbide Cutters with the Multiedged "throw away" ARMIDE inserts

STYLE TR
Holds Triangular (6-edge) "Throw Away" Inserts



Write for
Bulletin C17

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5209 W. ARMSTRONG AVE. • CHICAGO 30, ILL.



New ARMSTRONG Armide Carbide Insert Tool Holders hold multiedged, throw away Armide inserts. They end tool grinding and reduce down time. After an edge dulls, a slight turn of the clamping screw permits rapid indexing of the insert to a new cutting edge. Triangular inserts have 6 cutting edges; square inserts have 8 edges. They are available in three grades—Armide 350, 370, or 883.

ARMSTRONG Armide Carbide Insert Tool Holders are furnished either "Right Hand" or "Left Hand" in the two styles illustrated, each in 3 sizes.

TECHNICAL BRIEFS

Instead of the conventional nozzle alignment, the unit has a specially designed head. This locates the nozzle off center from the blowpipe center line. The operator widens the kerf uniformly by simply rotating the blowpipe. Once this is done, the blowpipe itself sets into the kerf in order to



Weighing 139,000-lb, this riser measures 120-in. across.

deepen the cut. This technique, using extremely large preheat and up to 9000 cu ft per hour of cutting oxygen, enables the blowpipe to cut through very heavy sections.

The blowpipe uses a cartridge type mixer for thorough mixing of gases. Its length can be altered to match job requirements.

Testing:

X-ray diffraction widely used for metals analysis.

Over 30 pct of the plants and laboratories replying to a recent survey state that they use X-ray diffraction and spectrography for analysis of metals and alloys.

Initiated as an educational project, the North American Philips Co. is presently conducting the poll. It includes replies not only from users of their own equipment, but also from those who use instruments made by other manufacturers.

Among other related industries using X-ray diffraction techniques for analysis tasks are: minerals, 40 pct; corrosion, 12 pct; dust and

air pollution, 9 pct; abrasives, refractories, slags, intermetallics and furnace products, 13 pct; rare earths, 1 pct; and irradiated materials, 1 pct.

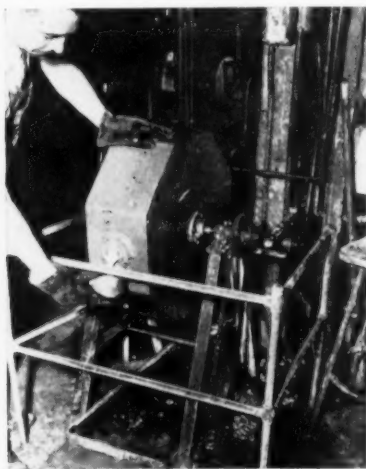
A summary giving information gathered thus far in the survey is available to all contributing organizations; those who desire the questionnaire can obtain a copy from North American Phillips Co., 750 S. Fulton Ave., Mt. Vernon, N. Y.

Brazing:

Rotary drum stores pre-mixed flux.

Westfield Mfg. Co., maker of Columbia bicycles, silver brazes most of its bicycle frame joints. Formerly each brazing operator mixed his own flux, consistency of the flux varied from one brazing station to the next.

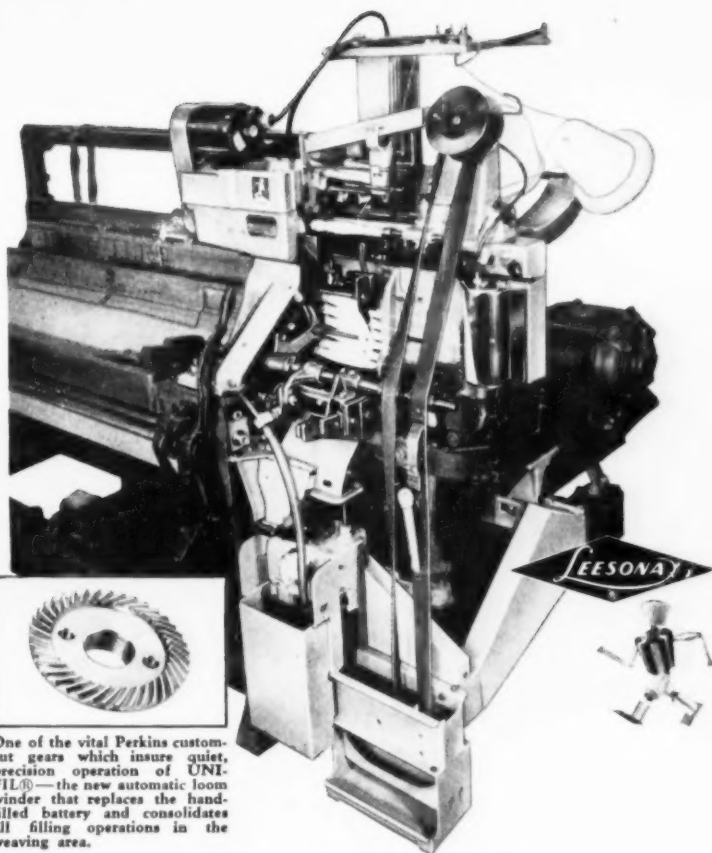
Uniform flux contributes to good brazing. Thin flux runs off easily. This can prevent the brazing alloy from wetting uniformly. It exposes



This drum holds enough pre-mixed flux to last several shifts.

the parent metal to direct heat, complicating clean-up operations because of scaling or discoloration produced by overheating. Thick flux is hard to apply evenly; it is frequently wasteful.

To assure flux consistency and to save operator time, the company centralized the operation. It now



One of the vital Perkins custom-cut gears which insure quiet, precision operation of UNIFIL®—the new automatic loom winder that replaces the hand-filled battery and consolidates all filling operations in the weaving area.

Perkins Custom-Cut Gears Specified for Universal Winding's New Unifil® Loom Winder

Quality and service determine Universal Winding Company's choice of Perkins custom-cut gears for many of their machines, including the new UNIFIL®. Perkins gears are precisely cut to exact specifications which eliminate noise, wear and backlash. This means fewer rejects, lower maintenance cost and longer gear life. Extensive facilities and modern equipment, backed by 52 years of gear-making know-how insure prompt delivery, as scheduled, to meet production needs. You, too, can benefit from Perkins quality and service. Perkins can cut your gears from any material—metallic or non-metallic. If you require a special deep or shallow pitch, a gear with a hub, clutch teeth or other special features, Perkins engineers will work with you to insure efficient and economical gear design. Ask us to quote on your next gear requirement.



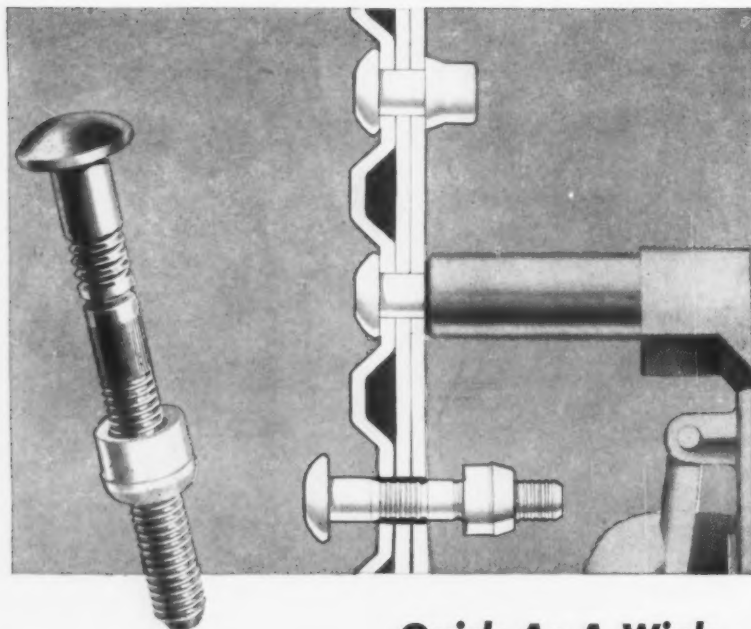
YOURS ON REQUEST
— Folder illustrating gears Perkins has made — face gears, generated and curvic clutches; bevel, spiral, helical and spur gears; ratchets, sprockets and ground thread worms ... from all materials. Includes Perkins facilities for producing various gear types and sizes. Write today.



PERKINS
MACHINE AND GEAR CO.

Dept. 11, West Springfield, Mass.

Telephone: REpublic 7-4751



Quick As A Wink— You Get Secure, Permanent Fastening With Townsend Lockbolts

In less than a second, with one squeeze of the trigger, a Townsend lockbolt pulls the work together with a high clinching action, is locked in place with uniform pressure. It is a quick method of producing tight, rigid, permanent fastenings that cannot loosen even under extreme vibration or shock conditions.

Townsend lockbolts combine the advantages of riveting and bolting—eliminate the disadvantages. Installation is fast—under certain conditions, one man will install 30 in only 60 seconds. Fewer workers will complete an assembly in less time than when riveting or bolting.

The clamping action, or clinch, of Townsend lockbolts is higher than rivets—is more uniform than bolts and nuts. The lockbolt fills

the hole better than other fasteners, thus making possible a more rigid joint and also providing an effective liquid seal.

The Townsend lockbolt consists of two precision-made parts—a pin and a collar. Locking grooves are provided on the pin into which the collar is swaged by the pneumatic gun. The pulling section of the pin breaks in tension at a predetermined point when the setting action is completed.

Townsend lockbolts are available in steel and aluminum alloy, in $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ " and $\frac{3}{8}$ " diameters, in grip lengths ranging up to 2", in various head styles. For information on Townsend lockbolts, write to Townsend Company, P.O. Box 237-B, New Brighton, Pennsylvania.

Licensed under Huck patent nos.

RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; 2,754,703.

THE FASTENING AUTHORITY

Townsend

COMPANY • ESTABLISHED 1816

NEW BRIGHTON, PENNSYLVANIA

Sales Offices in Principal Cities

Cherry River Division • Santa Ana, California

mixes enough flux in a single batch to supply several shifts. The centralized method permits use of 60-lb flux containers. This takes advantage of savings from bulk purchasing. The flux is mixed and stored in the rotary drum. Operators refill their flux containers whenever needed. Since the drum is completely closed, flux properties remain uniform until completely used.

The drum is rotated at about 40 rpm by a V-belt drive to provide a continuous mixing action. A lever-operated coupling on the drum axle disconnects the drum from the drive, so an operator can stop the drum to pour out flux without shutting off the motor.

Fastening:

**Over-tightening a bolt
may not be over-tightening.**

If strength of the joint is your only concern in an assembly, it's almost impossible to get the nut too tight. That's the word from fastener specialists at Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y. If wrenching up hard doesn't break a bolt it will never break or wear out in service, they say, presuming it's the right bolt for the job.

The tension left in a bolt after it's tightened opposes the external load applied in service and keeps the nut tight. So long as pre-load tension, clamping joint members together, is greater than external load, the bolt won't fail. Maximum pre-load tension means maximum resistance to external stress.

Sometimes It's Bad

Under tightening may affect joint strength, but "over tightening" never does. However, there are applications where too much tightening is bad:

When the man with the wrench gives all he's got in tightening up a joint the bolt will probably stretch permanently, deforming the threads a little. This doesn't affect strength, but nut and bolt can't be reused. Therefore, where bolts are permanent fixtures, as-

semblers needn't worry about over tightening. Where fasteners may be removed in service, avoid tightening the bolt to the point where it is permanently stretched.

Soft Material Stretches

A steel bolt stretched in tightening no more than 0.001 in. (0.002 for heat treated bolts) per inch of grip length (distance between bolt and nut) will return to normal without deformation of threads.

Where a soft-surfaced material, such as a gasket, is part of the joint, it's impossible to put much tension in the bolt. Tightening simply compresses the soft material. In this kind of joint, fastener engineers recommend tightening the bolt just a little more than enough to hold the joint together under load.

Handling:

TV setup allows accurate positioning of turbines.

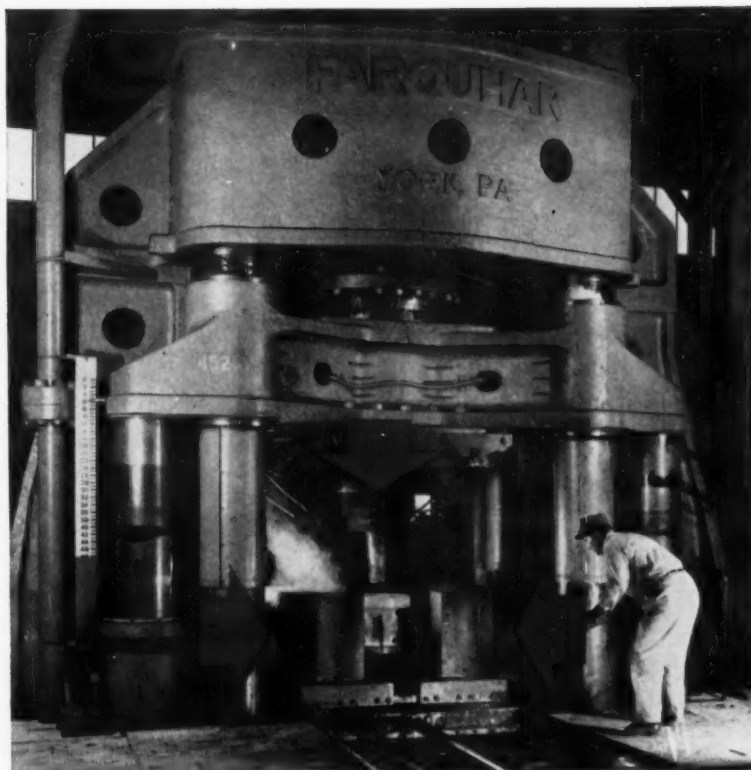
Using a closed circuit television camera, General Electric engineers accurately position five-ton turbine sections at their gas turbine department in Schenectady.



Engineer observes position of turbine in the monitor.

Previously the turbine shells were aligned only by stretching a taut wire through the turbine and estimating when the shells were in position.

When lining up the turbine shells,



This 5000-ton Farquhar Split-Die Forging Press is used to form components of oil-well control equipment.

This Farquhar Split-Die Forging Press forms both bore and periphery in one fast, clean operation

The job was to press-forg parts weighing up to 2000 pounds having irregular contours on both the bore and the periphery. These parts in service had to withstand working pressures up to 15,000 pounds per square inch and temperatures up to 1600 degrees F. The successful solution was to put the job on a Farquhar Split-Die Forging Press.

This Farquhar Split-Die Forging Press applies horizontal forces from opposite directions as well as the normal down-action. The result is the production of high-strength parts with unusually clean surfaces whatever the contour. This cuts finish machining time to a minimum and provides forgings with uniform physical properties and controlled grain structure. Reported production savings run as high as 25% with rejects kept to a minimum.

For your tough forming jobs, investigate Farquhar Split-Die Forging Presses. Write today for complete information or ask for our recommendations and proposals.

Special Machinery Built to Your Requirements . . .

Our skilled staff will economically build your special machinery. We'll process your inquiry promptly.

A. B. FARQUHAR DIVISION

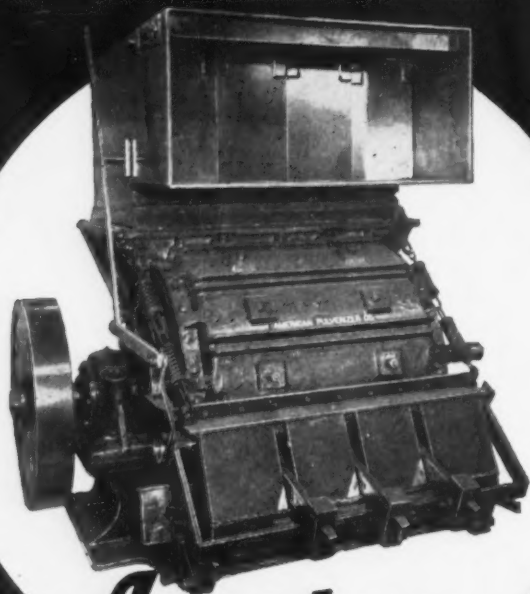
The Oliver Corporation

Press and Special Machinery Department
York 25, Pennsylvania



CASH IN YOUR CHIPS

Change Metal Turnings Waste
into More Profitable Shoveling CHIPS



American
METAL TURNINGS
CRUSHERS

No progressive, profit-conscious company—who produces 10 or more tons of metal turnings per month—can afford to ignore the profit potential of a modern chip salvage system . . . with an American Metal Turnings Crusher at the core.

American installation profits include: \$4 more per ton for chips than for machine turnings; up to 50 gallons per ton in cutting oil recovery; 75% less storage; easier, faster handling.

How many profit dollars are you losing under present operations? If, for example, you're currently producing 20 tons of turnings a month . . .

THIS COULD BE YOUR PROFIT STORY FOR NEXT YEAR!

240 Tons Metal Turnings per Year.....	\$ 960.00
(20 tons/month at \$4 extra per ton)	
6,000 Gallons Recovered Cutting Oil at 30¢/Gal.....	\$1,800.00
(50 gals. per ton x 240 tons = 12,000 gals. Half of this, 6,000 gals., can be credited to use of chips instead of turnings in reclamation)	
Estimated Savings in Manpower, Storage, Tools, Maintenance, Freight, etc.....	\$ 300.00
TOTAL GROSS PROFIT	\$3,060.00



WRITE for Metal Turnings Crusher Bulletin.

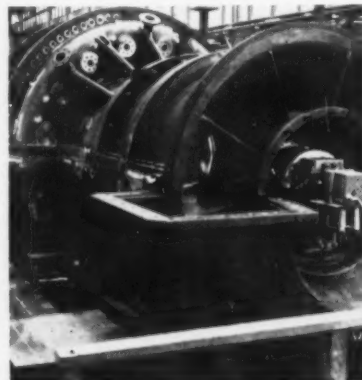
Designers and Manufacturers of Ring Crushers and Pulverizers

1439 MACKLIND AVE. • ST. LOUIS 10, MO.

TECHNICAL BRIEFS

the camera is bolted, leveled and centered on the first or master shell. When another shell is to be attached, a target is centered in the new shell and the camera lens focused to the known distance to the target.

Then by watching the monitor, located 15-ft from the camera, the operator notes where the target



Television camera (far right) bolts onto master shell.

lies in relation to the camera lens. Thus, he is able to carefully adjust the shell-connecting bolts, and align the new shell.

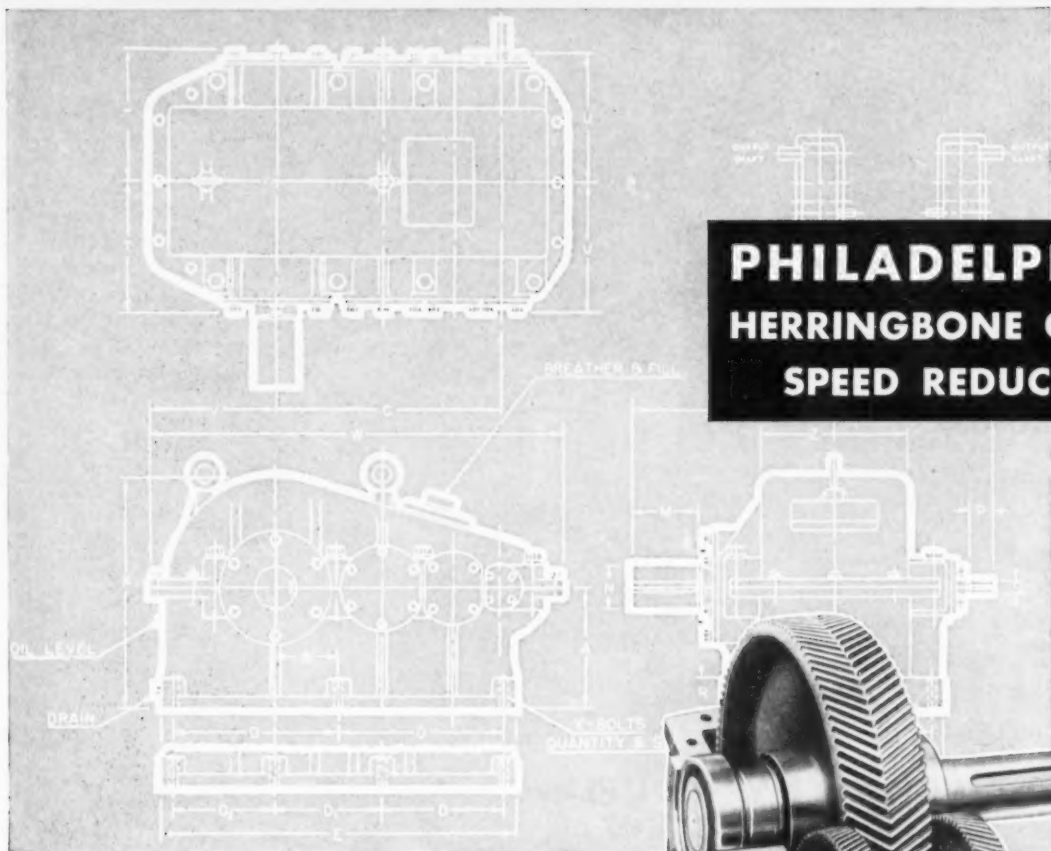
Picture Much Clearer

The closed circuit TV chain, consisting of camera, cable and monitor, was developed by the company's technical products department. The camera is equipped with a telescopic lens and operates under rugged conditions and low light levels. The monitor resembles a home TV receiver, but because of its 600-line resolution, brings in a much clearer picture.

New Films:

"Mechanical and Hydraulic Hand Lift Trucks" shows basic types of hand lift trucks and their operations. Considerations in selecting equipment and how to use platform and pallet type hand lift trucks are covered. 25 to 30 minutes (with script). 30-frame black and white slides. \$2.00 per print. Assn. of Lift Truck and Portable Elevator Manufacturers, Suite 759, One

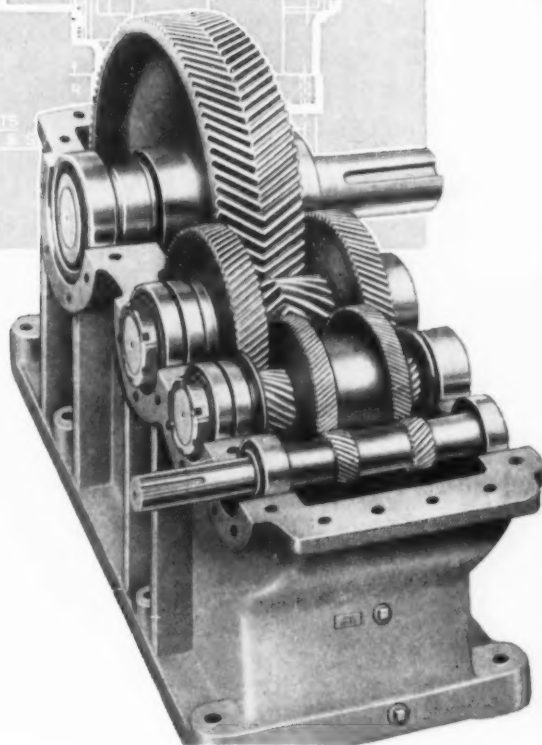
Here's the Reducer with a BACKBONE ... and a BACKGROUND



PHILADELPHIA HERRINGBONE GEAR SPEED REDUCER

Yes, Philadelphia Herringbone Reducers can truthfully be said to be Reducers with a "backbone" and a "background," because we have not only been making industrial speed reducers since their inception—but we were one of the pioneers in applying the Sykes continuous tooth type gear to speed reducers.

If you have a problem involving high horsepower speed reduction with heavy shock loads, Philadelphia Herringbone Reducers are the answer. These quality-built units are available in Single, Double and Triple Reduction Types, offering a wide selection of capacities and reduction ratios. The continuous tooth type herringbone gears assure evenly distributed pressure over each tooth from the top to the working depth line—which means exceptionally long life, minimum vibration, quiet operation and maximum transmission of power . . . Thousands of Philadelphia Herringbone Reducers are in daily use, in most every line of industry. Be convinced, send for Catalog H-55.



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INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS
Virginia Gear & Machine Corp. • Lynchburg, Va.

Gateway Center, Pittsburgh 22, Pennsylvania.

"How to Make a Motor Go and Go, and Go, and Go," covers maintenance of electric motors. It depicts by means of cartoon characters how motors can be kept in good operating condition. 20 minutes. 16mm color-sound slides. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

"The Hyster Monomast," shows a new lift truck design. Comparative action views attempt to illustrate the improvement over conventional units afforded by the lift truck with "panoramic visibility." Fast lifting speeds, great load stability and considerable operator safety factors are pictured. 10 minutes. 16mm color-sound. Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.

"Position For Production," covers the ABC's of welding positioners, automatic manipulators and turning rolls. It provides application tips for eliminating slow production, high labor costs, accident hazards and poor quality. 18 minutes. 35-mm color-sound slides. Worthington Corp., Harrison, N. J.

"The Rockford Kopy-Kat" shows operation of a hydraulic auxiliary tracing attachment for shapers, planers, slotters, shaper-planers and lathes. The movie includes a variety of actual duplicating jobs, from the simplest to the most complex. 36 minutes. 16mm color-sound. Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.

"The Long Pull" tells the story of steel wire by selecting representative products made from it and illustrating the manufacturing processes each must undergo. The list of products is impressive. It

A circular chart titled "WHAT'S Your COUPLING APPLICATION?" with various fluid types listed around the perimeter: GASOLINE, GREASE, STEAM, ACETYLENE COOLANTS, REFRIGERANTS, HYDRAULIC FLUIDS, OXYGEN, WATER, AIR, VACUUM, and OIL. In the center, the text reads: "SPECIFICALLY ENGINEERED ... NEVER MERELY ADAPTED ... FOR EACH PARTICULAR TYPE OF APPLICATION". At the bottom, the word "HANSEN" is prominently displayed in a dark oval.

QUICK-CONNECTIVE COUPLINGS

For Pneumatic or Hydraulic Line Service

Regardless of whether your particular application requires One-Way Shut-Off, Two-Way Shut-Off, or Straight-Through Couplings — or Couplings for special service on fluid lines carrying oxygen, acetylene, gasoline, steam, etc. — you can always select a Hansen Coupling specifically engineered for your requirements.

As the result of years of experience with fluid line layouts in thousands of plants, each type of Hansen Coupling is carefully designed to incorporate the specific features needed for the job it is intended to do.

The next time you plan to alter or install a fluid line hook-up, make use of the know-how of your nearest Hansen representative. You'll find him a real help in getting exactly the Couplings you need to do the job.

Write for the Hansen Catalog
Here's an always ready reference when you want information on Couplings in a hurry. Lists complete range of sizes and types of Hansen Quick-Connective Couplings. Write for your copy.
Representatives in Principal Cities



ONE-WAY SHUT-OFF



TWO-WAY SHUT-OFF



STRAIGHT-THROUGH COUPLING

QUICK-CONNECTIVE FLUID LINE COUPLINGS

SINCE 1915

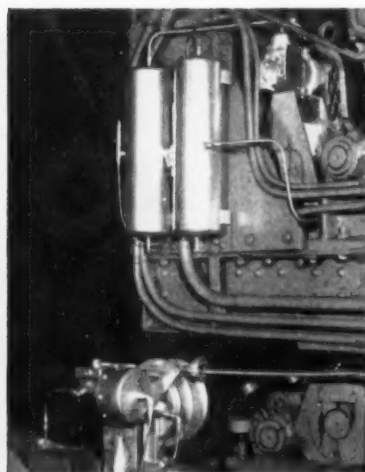
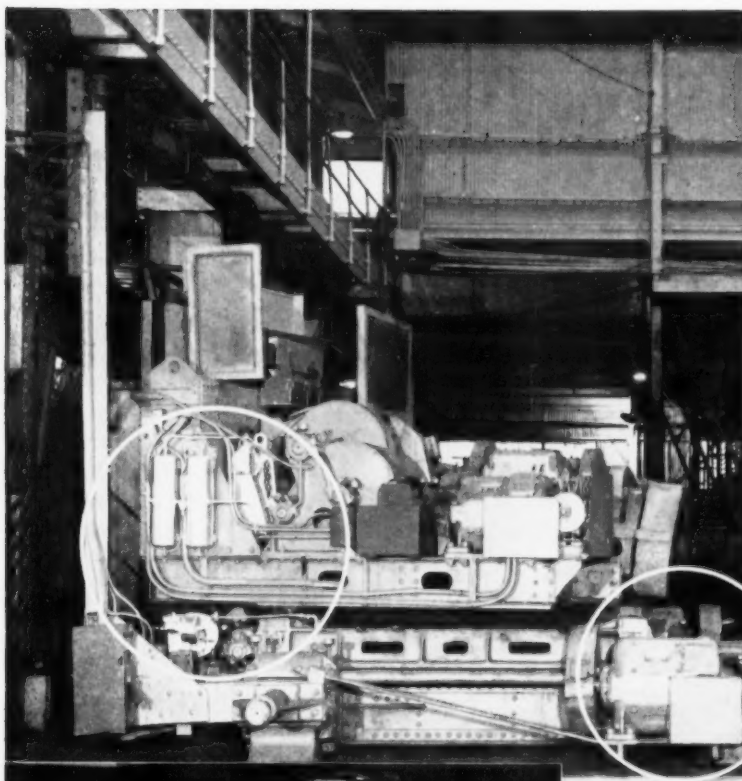
THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

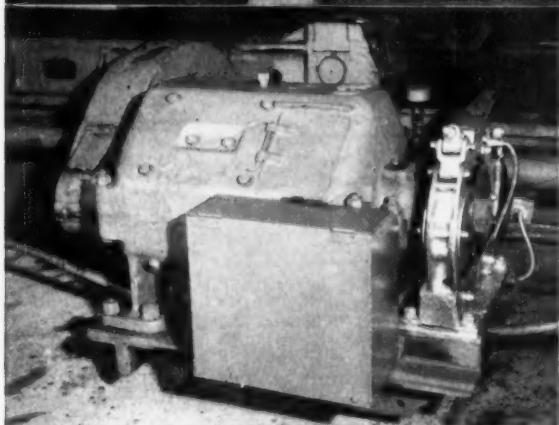


Cameramen shoot a color scene for the film about steel wire.

includes: wire cloth or screening, chains, fan guards, household barbed wire, woven fencing, tire brushes, auto seat springs, furniture coil springs, screws, nails, bolts and nuts, rivets, reinforced concrete pipe, chain link fencing, and submarine telephone cable. 28 minutes. 16mm color-sound. Bethlehem Steel Co., Bethlehem, Pa.



Air line and take-up reel provides controlled air pressure to the Wagner power cluster which actuates the brakes. Wagner Air Compressor and Tanks, at top of photo, supply the system with necessary air pressure service.



U.S. Steel's wheel charging car is equipped with Wagner type H Hydraulic Crane-Bridge Brakes, as shown at left.

Wagner power brake system controls movement of wheel charging machine for U. S. Steel

This 21-ton wheel charging car at U. S. Steel Corporation, Gary, Indiana plant works at high speed to feed an automation line. It takes red hot railroad car wheels from a forging press—carefully places them in a re-heating furnace—moves them to the automated line for shaping, truing and marking.

A Wagner Air-over-Hydraulic Industrial Power Braking

System, especially designed for this application, keeps this machine under complete control. The operators can make safe, sure, precise stops with ease.

Wagner can now offer such Power Brake Systems to meet *your* requirements. Call your nearby Wagner Field Engineer—let him help you make safe, sure stops with your speeded-up charging machines.



BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC



News Item: Statistics show that hospital emergency wards do a rushing business on weekends—and not just after Saturday midnite, either, but all weekend long—patching split heads, wrenched backs, mashed thumbs, broken arms and chopped feet. All this "business" results from that modern phenomena, "do it yourself."

Any fool knows that "do it yourself" is the way to "Save - Save - Save," as the TV commercials say. But some of the smarter people have discovered that "do it yourself" isn't necessarily the bargain-counter proposition it's been made out to be—that the fun you get out of it (if any) generally costs money in the long run. These people are relearning a truth established years ago—that the Division of Labor, or specialization, results in greater efficiency. This holds just as true in the production of industrial goods such as gears: the actual cost, hidden as well as apparent, of gears produced in a back shop or part-time department is bound to be greater than the ultimate cost of gears produced by an efficient, highly-specialized gear manufacturer like Cincinnati Gear. And combine the economic advantages that result from our efficient production and consistent top quality with the *care-of-mind* that results from our traditionally top-notch service, and you'll understand why so many firms (firms who recognize "do it yourself" for what it is) depend on us year after year for all their custom gear requirements.

THE CINCINNATI GEAR CO.
CINCINNATI 27, OHIO
Fifty Years of "Gears—Good Gears Only"



MATERIALS ROUNDUP

METALS: Wrought Powder

Using a new method, powdered metals turn into strips, bars and tubes of long length . . . These products do not have impurities present in ordinary cast billets . . . Precise control possible.

Metal powders become wrought products by using a new method. Applying this technique, research engineers are now able to "tailor-make" metal powders into wrought products of strips, bars and tubes of long length, hitherto unobtainable.

Eliminates Disadvantages

Known as "Sinterwrought," the process is a development of the Sintercast Corp. of America, Yonkers, N. Y. It eliminates many disadvantages of the company's previous powder metallurgy techniques.

The powdered wrought products have great strength and ductility. Moreover, report the developers, they do not contain the impurities

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 121. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

tions in highly uniform dispersion.

Metals handled by the new process include aluminum, copper, nickel, cobalt, carbon steel, stainless steel, and alloys of these metals. Recent experiments indicate that columbium, titanium and zirconium may also be handled by the powder wrought technique.

Finishing:

Two magnesium finishers provide corrosion resistance.

Two magnesium finishing processes provide magnesium with high corrosion resistance, abrasion resistance and paint bonding properties. They eliminate the need for precise measuring and mixing of several chemicals and do away with the resultant inconvenience and chance for error. Additionally, they do not require complicated control procedures.

Both processes are approved for use by the Magnesium Div., Dow Chemical Co. Turco Products, Inc., makes them.

Mixes With Water

One of the finishers is a production-line process for providing corrosion resistance, paint base qualities and abrasion resistance to all forms and alloys of magnesium. The one-package pow-



Powder in foreground forms the wrought cylinder at right.

present in the cast billets from which conventional wrought materials are made.

Extremely precise control of composition can now be achieved with them. In addition, critical metallic or non-metallic ingredients can be added to the composi-

dered material is merely mixed with water. The same solution may be used for processing by either direct or alternating current. Hexavalent chromium is the only control required, and the bath is brought back to strength merely by addition of the original material.

Touches Up Scratches

The other material is a liquid process for touching-up coated magnesium that has been scratched or abraded. The process, which does not require electrical current, is also used where assemblies are too large to be immersed. Used as received, the compound is merely brushed or sprayed onto the surface to be coated. It is also recommended for use in a dip tank to replace pickling solutions used prior to chrome plating.

Alloys:

Refinery uses almost all alloy piping.

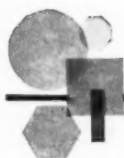
Approximately 1400 separate pieces of alloy fabrication, averaging more than a ton each, make up substantially all the piping of a giant new oil refinery.

Delivered by the Flori Pipe Co. of St. Louis, some 250-mi of alloy pipe make up the transportation system of the Tidewater Oil Delaware Flying A Refinery, located near Wilmington, Del.

More than 1500-tons of fabricated alloy went into the project. These pipes have wall thicknesses ranging up to 1½-in. and diameters up to 20-in. Operational requirements in the refinery include temperature ranges to 1450°F and pressure ranges to 900-psi.

Fabricates 13 Alloys

To meet requirements, the company fabricated 13 different alloys: carbon-moly, 1-pct chrome, 1¼-pct chrome, 4 to 6-pct chrome, 6 to 8-pct chrome, 8 to 10-pct chrome, inconel, monel, incoloy, 99-pct nickel, type 304 stainless, type 316 stainless, and an aluminum alloy.



WHEELOCK, LOVEJOY & COMPANY, INC.

1250 Marquette Street, **Cleveland** Ohio



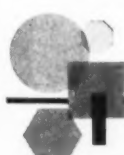
WHEELOCK, LOVEJOY & COMPANY, INC.

1855 So. Kilbourn Avenue, **Chicago** Illinois



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You'll get quick action on your order for alloy steel bars, billets or forgings... no matter what size, shape or heat treatment you require... when you call any one of our seven warehouses.

All seven are conveniently located in principal industrial areas.

Each is staffed by expert metallurgists, and is well-stocked to give you speedy service.

Fill your current needs by ordering our own HY-TEN steels, the "standard steels of tomorrow", or standard AISI or SAE grades.

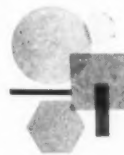
Or write today to our Cambridge office for your free Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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144 Milton Street, **Buffalo** New York



WHEELOCK, LOVEJOY & COMPANY, INC.

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HOME OFFICE:

WHEELOCK, LOVEJOY & COMPANY, INC.

126 Sidney Street, **Cambridge 39** Massachusetts

The project's size required in excess of 10,000 welds. Specifications required 100-pct penetration for all welds, without using backing rings. To accomplish this, the firm used an inert gas non-consumable electrode process. All butt welds were radiographed; nozzle welds and coupling welds were either magnetic particle inspected or penetrant dye checked.

A technique of moving fabricated pieces across a squaring

floor eliminated fabricating errors almost entirely. The single minor fabricating error that slipped through amounted to 1/60th of 1-pct on the \$3,000,000 job.

Corrosion:

Vinyl resin base paints resist time, rolling waters.

After eight years in the rolling waters of the Mississippi River

anti-corrosion vinyl resin base paints are still in near-perfect condition.

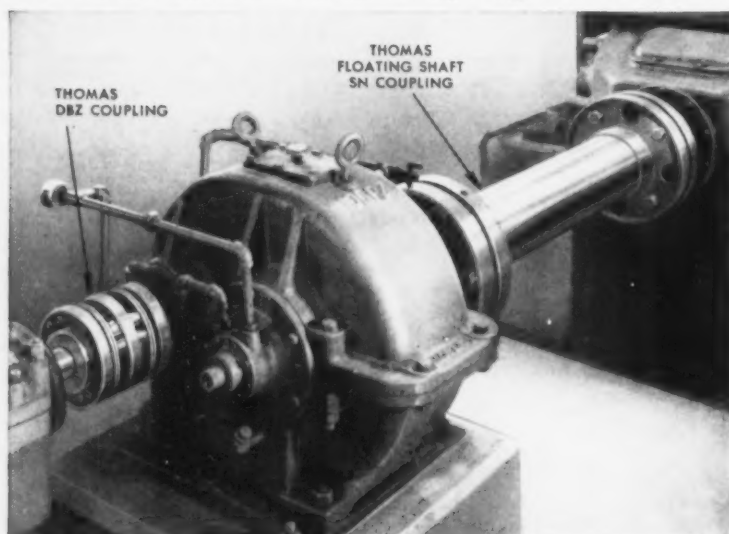
The paints protect metal gates and underwater structures from wear and rust on a 9-ft deep navigation channel connecting St. Louis and Minneapolis. There are 27 locks and dams on the channel. All were constructed, and are maintained, by the Army Corps of Engineers.

Wind and ice attack the structures in the winter and broiling sunlight strikes in the summer. In addition, the surfaces and their protective coats, must resist constant abrasion from silt and debris carried by the churning waters.

Coatings that last longest under these conditions are found to be the most economical. Equally important to the channel operators is the speed with which they apply

THOMAS FLEXIBLE COUPLINGS

Give You Freedom From Coupling Maintenance



NO LUBRICATION

NO MAINTENANCE

NO WEARING PARTS

Future maintenance costs and shut-downs are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

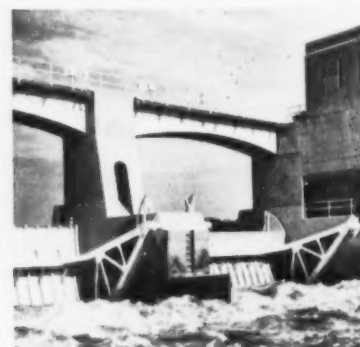
They will protect your equipment and extend the life of your machines. Properly installed and operated within rated conditions, Thomas Couplings should last a lifetime.

Under Load and Misalignment only Thomas Flexible Couplings offer all these advantages:

- 1 Freedom from Backlash Torsional Rigidity
- 2 Free End Float
- 3 Smooth Continuous Drive with Constant Rotational Velocity
- 4 Visual Inspection While in Operation
- 5 Original Balance for Life
- 6 No Lubrication
- 7 No Wearing Parts
- 8 No Maintenance



Write for Engineering Catalog 51A
THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.



Abrasive and corrosive elements continually attack these gates.

and dry. A recent vinyl spray application took three days to paint, 48 hours to dry. This compares with eight to ten days for a previous coating.

The new vinyl coating is a three-part system; it builds up to a thickness of about 5½-thousandths of an inch. After sandblasting metal surfaces, painters apply a wash primer, followed by two double spray coats of red lead. Finally, they apply two double spray top-coats containing aluminum pigment. Each successive coat is based on vinyl resins to obtain necessary moisture resistance.

The vinyl resins are made by Bakelite Co., a division of Union Carbide & Carbon Co., New York City.



GRANITE CITY STEEL
GRANITE CITY, ILLINOIS

Granite City saves fuel, raises production and quality with Cities Service Heat Prover!

Nation's 14th largest steel producer uses Heat Prover on soaking pits, open hearth furnaces and on their annealing furnaces.

Granite City Steel burns enough fuel in one year to heat a five-room house for 38,000 years!

Obviously, if this fuel burns inefficiently, the loss could be staggering. But Granite City has no worries on that score. "Thanks to the portable Cities Service Heat Prover, we get better fuel efficiency, better quality, greater production than ever," they report.

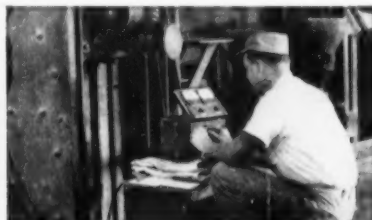
"Because it provides a quick, highly accurate check of fuel-air ratio, the Heat Prover has proved invaluable in controlling combustion conditions in open

hearth furnaces, soaking pits, and annealing and normalizing furnaces. In a matter of seconds it tells our engineers how efficiently the furnaces are working—whereas former tests often took hours and didn't provide as accurate a picture. Anyone in this business can probably benefit from this ingenious device."

Supplied and maintained free by Cities Service, the remarkable Heat Prover is today used and applauded by scores of major steel producers. If you'd like to learn how it could simplify your operation as it has theirs, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.



20TH CENTURY BLOWGUN—a bazooka—is readied by technicians for tapping open hearths. They are part of Granite City's 4800 skilled employees.



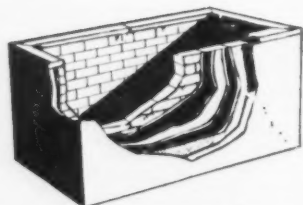
HEAT PROVER AT WORK at back of open hearth furnace. In minutes it provides accurate check on furnace efficiency—saves hours required by former testing.



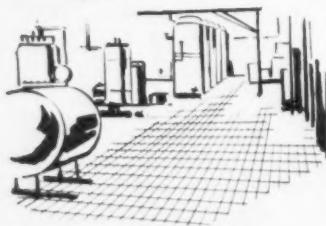
CONTROL TOWER at blooming mill guides ingots as they pass through rollers. Granite City has capacity of 1,200,000 net tons of ingots annually.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

the most enduring way to ... **STOP CORROSION**



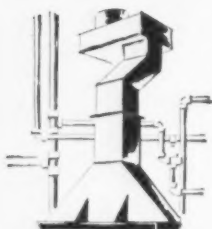
with **ATLAS TANK LININGS** for steel or concrete tanks. A complete corrosion-proof covering system from primer to protective brick sheathing.



with **ATLAS CORROSION PROOF CEMENTS** for the most severe conditions. Protection against acids, alkalies, salts, solvents and other corrosives.



with **ATLAS PROTECTIVE COATINGS** for almost every purpose. A complete line to assure the proper protective coating for the job.



with **ATLAS RIGID PLASTIC STRUCTURES** for tanks, fume exhaust duct work and complete pipe systems. Fabricated of highest quality corrosion proof plastics.

Specify **ATLAS**

Tear out this ad and check the block where corrosion protection is most needed in your plant. You will receive a complete bulletin giving all technical information.

- ☐ CEMENTS
- ☐ LININGS
- ☐ PROTECTIVE COATINGS
- ☐ RIGID PLASTIC STRUCTURES

TECHNICAL REPRESENTATIVES THROUGHOUT THE UNITED STATES



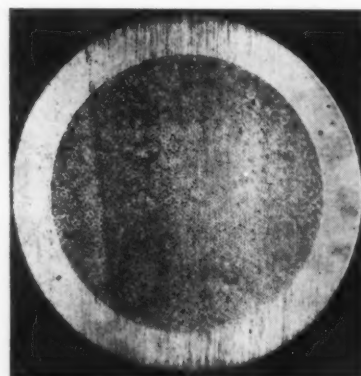
MATERIALS ROUNDUP

Wire:

High strength steel has heavy copper coat.

High strength steel with a heavy copper coating is now in limited production for communications, fabrication and other applications.

Although recommended especially for telephone and telegraph use, the wire meets multiple requirements of high tensile strength (up to 250,000-psi), electrical conductivity, bright finish and resistance to fatigue and corrosion. The copper coating joins with the steel core in a permanent



Micrograph of 0.104 - in. wire shows copper coated steel core.

bond. This permits twisting, stranding, weaving, braiding, bending or flattening the wire without rupturing the bond. The wire is available from National Standard Co., Niles, Mich.

Materials:

Plastic panels feature built-in metal mesh.

Glass fiber-reinforced plastic panels recently introduced feature embedded aluminum or steel diamond mesh.

The metal-reinforced translucent panels offer semi-transparent protection against flying particles and liquid spray. They may also be used for protective skylights, windows, and other fenestrations.

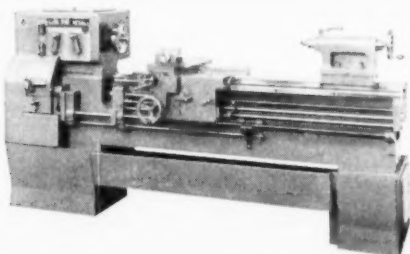
Announced by Resolite Corp., Zelienople, Pa., the panels have high impact resistance due to the metal mesh reinforcement.

LeBlond Sliding Bed Gap Lathes

The most versatile lathes in the world

17"/28"

Regal

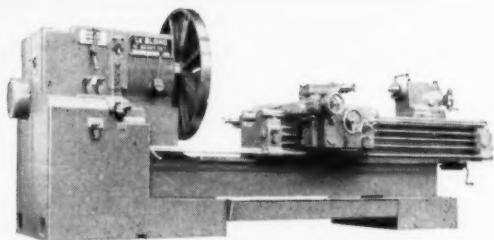


For turning a variety of parts—particularly the unpredictable extremes you encounter in maintenance and job shop work, LeBlond Sliding Bed Gap Lathes are unsurpassed. At left is the 17"/28" Regal, smallest of the four LeBlond Sliding Bed Gap Lathes.

Major features, 17"/28" Regal: Hardened and ground replaceable steel bed ways. Combination gear-belt drive headstock. 12 spindle speeds, 48 feeds and threads. Both feed rod and leadscrew. 3 bearing spindle. Write for Bulletin RG-210-A.

16"/38"

Heavy Duty

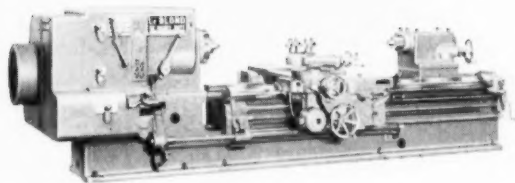


With bed closed, LeBlond Sliding Bed Gap Lathes function as regular engine lathes. The special bed slides open to form a gap that will accept odd-shaped parts and large diameter work. This also provides greater bed length, more than 50% greater distance between centers.

Major features, 16"/38" Heavy Duty: Combination gear-belt drive provides a complete speed range from 16 to 2000 rpm. 4-way power rapid traverse. New spindle mounting for safe high speeds. Hardened and ground bed ways. Write for Bulletin SBG-104-A.

25"/50" and 32"/60"

Heavy Duties



Seventy years of LeBlond experience in solving day-by-day turning problems, extensive laboratory research and practical ideas from our own shop combine to give Sliding Bed Gap Lathes features to meet your turning requirements for years to come.

Major features, 25"/50" and 32"/60" Heavy Duties: 36 speeds at high power. 4-way power rapid traverse. Automatic lubrication in the headstock, quick change box and apron. Hardened and ground bed ways. Anti-friction bearings throughout. Write for Bulletin SBG-106-A.

The R. K. LeBlond Machine Tool Company

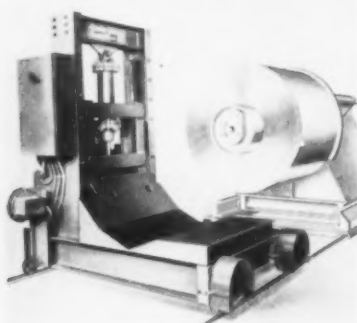
Cincinnati 8, Ohio

World's largest builder of a complete line of lathes for more than 70 years



NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 121 or 122.

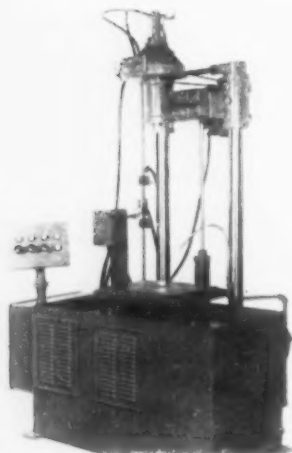


Heavy-duty coil car loads, unloads reels without pits

This heavy-duty coil handler loads and unloads reels quickly and safely. It operates on two rails set in concrete at floor level. This eliminates costly excavation, construction, drainage, maintenance and safety hazards of pits. A heavy-steel cradle carries the coils. Supporting the cradle is a rigid, L-shaped beam which raises and lowers hydraulically. The cars have through-axes, roller bearings and

flanged wheels. A lift truck, coil ramp or crane can do the loading. Then it moves across the tracks into position near the reel. It reloads the reel quickly as soon as the preceding coil is free. This minimizes downtime and assures high daily outputs from the line. Models come in three standard sizes to handle coils from 7500 to 20,000-lb. *Herr Equipment Corp.*

For more data circle No. 31 on postcard, p. 121

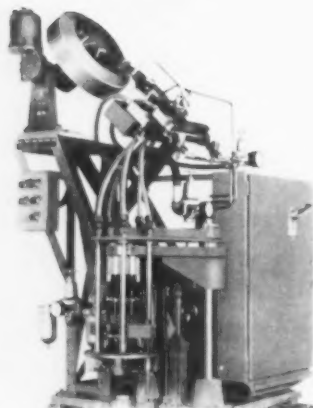


Vertical honing machine built for production use

Built for production use, this vertical type honing machine has a capacity up to 4-in. diam and 12-in. high. The V-belt driven spindle speeds are infinitely variable from 225 to 550-rpm. by means of a knob on the drive head. Adjustable limit switches control and set stroking lengths. Jogging switches on the control panel permit working in any desired section of the part without resetting the limit switches. An electronic timer controls the honing cycle; it varies within a range of 6 to 20 seconds. The ground table adjusts four ways

for squareness. Its 3-in. ground guide bars mount on the fabricated steel base which houses the coolant reservoir, pump and oil filter tray, as well as the hydraulic reservoir and pump. The driving head mounted to the bars with bronze bushings, is hydraulically controlled for stroking and constant pressure on the stone expansion. A regulator valve and pressure dial controls stone pressure. The machine is 84 in. high, 40 in. wide and 52 in. long. It uses a 440/220-110-v transformer. *Superior Hone Corp.*

For more data circle No. 32 on postcard, p. 121

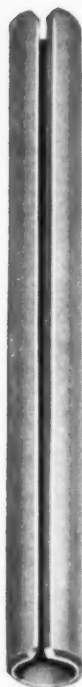


Automatic machine drives 3500 screws per hour

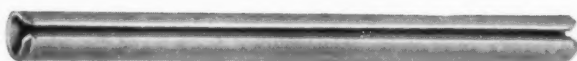
This torque control multiple screw driver automatically feeds and drives five screws at once without indexing or fixtures. The machine mounts on a plate, as part of a transmission stator assembly conveyor line. Completely automatic, a limit switch actuates it when the conveyor brings a stator into proper location. The unit handles 700 stators per hour. With precision control, it drives 3500 clutch head screws per hour. It has a vibrationless traveling head that carries five pneumatic drivers.

These are easy to service and adjustable for accurate torque control. An alternate manual switch, the machine's only non-automatic feature, operates the hopper or the multiple unit separately for set-up or try-out purposes. Air-electric controls, synchronized with the operation of the traveling head, control feeding. All electrical and pneumatic equipment conform to JIC standards. It wires into a 440-v, 60 cycle line. *D. & L. Tool & Machine Co.*

For more data circle No. 33 on postcard, p. 121



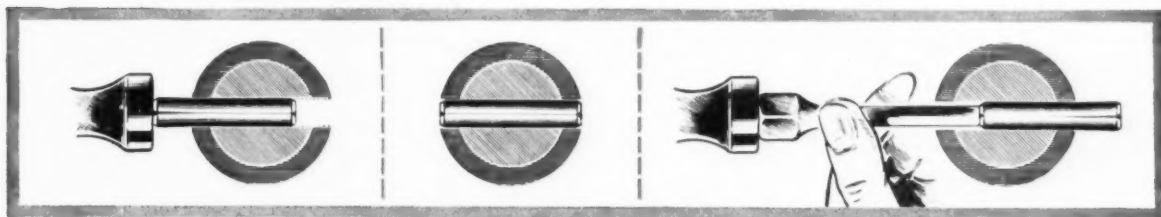
what makes this fastener DIFFERENT?



Several things. Rollpin® is a slotted, chamfered, cylindrical spring pin which drives easily into a hole drilled to normal production standards. It locks securely in place, yet can be drifted out and reused whenever necessary. This eliminates special machining, tapping, and the need for hole reaming or precision tolerances. Rollpin replaces taper pins, straight pins and set screws; for many applications it will serve as a rivet, dowel, hinge pin, cotter pin or stop pin.

And here's another difference that makes Rollpin the quality fastener in the field: ESNA's quality control builds consistent strength and performance into every Rollpin. Rollpin is uniform as to shear strength, dimensions, hardness, and insertion and removal forces.

HOW YOU INSERT IT



Drives easily by hammer, arbor press, or air cylinder and can be readily adapted to an automatic hopper feed. Requires only a standard hole, drilled to normal production-line tolerances.

Locks securely in place without using a secondary locking device; won't loosen despite impact loading, stress reversals, or severe vibration.

Removes readily with a drift pin without damage to pin or hole, can be used again and again in original hole.

HOW YOU SAVE

You pay less for Rollpins than for most tapered, notched, grooved or dowel pins. Installation costs are substantially less than for any fastener requiring a precision fit or secondary locking operations.

Because of their tubular shape, Rollpins are lighter than solid pins. Production maintenance is reduced with Rollpins: they do not loosen and because of their spring action they tend to conform to the drilled hole in which they're inserted, without material hole wear, eliminating the necessity of re-drilling or using oversize pins.

MATERIALS AND SIZES

Standard Rollpins are made from carbon steel and Type 420 corrosion resistant steel. They're also available in beryllium copper for applications requiring exceptional resistance to corrosive attack, good electrical, anti-magnetic, and non-sparking properties. Stock sizes range from .062" to .500" in carbon and stainless steels.



ELASTIC STOP NUT CORPORATION OF AMERICA

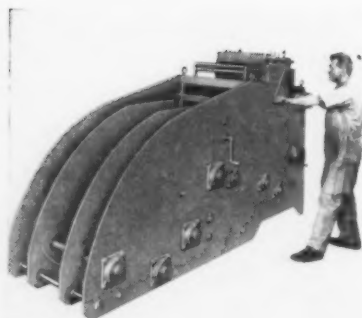
R40-277, 2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening informations:

- ☐ Rollpin Bulletin
☐ Elastic Stop nut Bulletin

- ☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____
Firm _____
Street _____
City _____ Zone _____ State _____

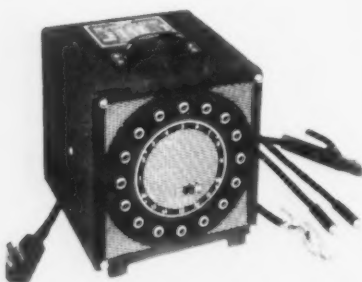


Cradle-straightener handles 60-in. diam coils

Rated at 4000-lb maximum capacity, a new coil cradle straightener combination accommodates coils up to 60-in. diam and 18-in. wide. It handles stock thicknesses to 0.045-in. The combination automatically supplies a controlled slack loop of straight, flat stock from which any machine can draw. Feeding devices thus are not required to pull against the weight of a heavy coil.

The unit also has a control feature which delays motor shut-off for any desired period up to 10-seconds after the slack loop is fully formed. This prevents unnecessary motor stops and starts, smooths out material flow and eliminates wear. A variable speed drive feeds stock at a controlled rate of 20 to 100-sfpm. *Benchmaster Mfg. Co.*

For more data circle No. 34 on postcard, p. 121



Arc welder, weighing only 80 lbs, welds 1½-in. steel

Convenient and highly mobile, a new hand portable industrial arc welder features 200-amp output. Weighing only 80-lb, the model is fan cooled for production use. It has a thermal overload switch for prevention of transformer burn-out. The unit employs a new ultra-high efficiency transformer, its manufacturer says, enabling the equipment to perform the work of

a conventional arc welder four to five times its size, weighing three times as much in some cases. It welds steel 1½-in. thick and cuts steel ¼-in. thick. Overall dimensions are only 12 x 13 x 14-in. The portable industrial arc welding unit is the first one of 200-amp output produced by this firm. *Brennen, Bucci & Weber, Inc.*

For more data circle No. 35 on postcard, p. 121

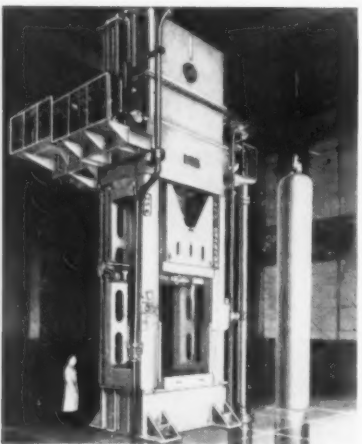


Lift truck has 100-in. turning radius, 7000-lb capacity

So compact that it will work inside a single-door boxcar, this pneumatic tire lift truck handles 7000-lb over rough yard terrain. It has a turning radius of 100 in. and a length of 106¾ in. A heavy-duty Hercules gasoline engine provides all-weather dependability; its large bore and stroke enables this 70-hp engine to develop a rated torque of 182-lb-ft at 1200-rpm. For maneuverability, the truck has hydraulic booster-type power steering as standard equipment. It fea-

tures center-point steering with a rugged steering axle which pivots about the longitudinal axis to maintain tire contact over rough ground conditions. Self-energizing aircraft type brakes have 166.4-sq in. of braking surface. A one-piece frame and body provide stability. The truck's design caters to the comfort of its operator; even the controls are positioned for easy operation. Special attachments come as optional equipment. *Hyster Co.*

For more data circle No. 36 on postcard, p. 121




Hydraulic press hot pierces high explosive 8-in. shells

This 1000-ton hydraulic press hot pierces high explosive 8-in. shells. It carries out the initial operation in a hot-forging-cold extrusion process used in shell manufacture. The machine has a bed area of 66 x 60-in., 98-in. daylight and a 60-in. stroke. It uses a 150-ton hydraulic ejector with a 24-in. stroke. The main ram has a closing and return speed of 1000-ipm and a pressing speed of 600-ipm. The press utilizes a pressure vessel of sufficient capacity to perform a high speed pressure of 19-in. The power system requires 350-hp for operation. In

using the hot-forging-cold extrusion process in the manufacture of shells, hot piercing eliminates a very heavy tonnage press that would be necessary for the initial operation in the normal cold extrusion process. Following the hot pierce, the same methods are used as in the cold extrusion process. This effects the same economies in the grade of steel required and the elimination of machining operations. This is one of five different type presses used. *Hydraulic Press Mfg. Co.*

For more data circle No. 37 on postcard, p. 121



To improve your product

ALCO CIRCULAR FORGINGS BRING HIGH QUALITY, UNIFORMITY

Proved steelmaking and forging techniques, new facilities at ALCO build quality and uniformity into circular forgings for savings to you; forged rings also available in new Hi-Qua-Led Steel*

Experience for over 80 years has developed ALCO's steelmaking and forging techniques for the production of high-quality circular forgings. This, coupled with new ALCO facilities such as an automatically controlled preheat furnace, modernized forging press and rolling mills, means unfailing uniformity of any order to your precise specifications — saving you money in machining and extending the service of your product.

For further advantage in machinability, ALCO also offers its circular forgings in Hi-Qua-Led Steel, a significant new development that drastically reduces machining time and tool wear without any change of basic steel properties. Hi-Qua-Led is available in all AISI open-hearth grades.

If your order is Hi-Qua-Led, ALCO metallurgists and machining technicians will be available for your trial machining runs to help you get the full benefits from this new steel.

ALCO circular forgings are available from 18- to 145-in. OD. You can get complete information from the nearest ALCO sales office, or write Spring & Forge Division, Dept. OCF 2, P.O. Box 1065, Schenectady 1, N. Y. for brochures.

*Trademark reg. applied for. Patent pending on lead addition method.



ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

Locomotives • Diesel Engines • Nuclear Reactors • Springs • Steel Pipe • Forgings • Oil-Field Equipment

ALL-HYDRAULIC!

SILENT HOIST KRANE KAR

HYDRAULIC
Boom Swinging
Boom Topping
Boom Telescoping
Load Hoisting

Originator and leader in its class for 30 years, **KRANE KAR** goes ALL-HYDRAULIC. Affords amazing ease of handling... touch control of all crane operations... with other engineering advances that simplify operator's work... eliminating gear shifting and clutch replacements... cutting maintenance to the bone and setting new standards of efficiency and productivity. Get the details. **Write, wire, telephone today.**

FLUID DRIVE
POWER STEERING



MODELS 1000 TO 25,000 LBS. CAP.

SILENT HOIST & CRANE CO.

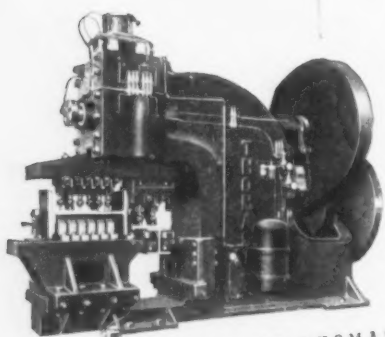
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
851 63rd Street, Brooklyn 20, N. Y.

BEAM PUNCHING

without tool change



THE newly designed Thomas Beam Punches are built in sizes to handle beams up to 12"-18"-24"-30" and 36", web and flange punching, with a single tool set-up. Any of the five sizes may be used with or without a Thomas spacing Table, depending on production needs.



THE TREND IS TO THOMAS

THOMAS

MACHINE MANUFACTURING CO.

PITTSBURGH 23, PA.

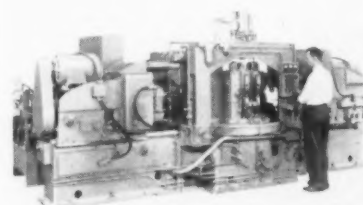
• Write for further information

PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

51 a

Indexing machine

Machining diesel connecting rods is this unit's job, and it does 84 of them an hour at 100-pct efficiency. The three-way, horizontal, automatic indexing unit's fixtures are manually loaded with two rods. These mount on the index table at the first station. At the second, it drills wrist pin holes and bores



the crankshaft's cap side. It bores the rod end and mills square the bolt bosses at the third. At station four, it semi-finish reams the wrist pin holes while sawing separates the cap from the rod. Finally, caps and rods unload at station one. **Greenlee Bros. & Co.**

For more data circle No. 38 on postcard, p. 121

Oil hole drills

Designed for production use in screw machines or turret lathes, a new line of high speed oil hole drills feature continuous holes through the body and shank. This permits a lubricant or air to pass freely to the drill point where it acts as a coolant, as well as a force to eject chips and dirt. Another feature of the drills is that they



may be easily cleared and cleaned if blocked by foreign matter in the coolant. They come in straight shank taper lengths from 7/16 to 1 1/2-in. by 64ths. Shank ends are tapped for use with threaded pipe connections or they can be made to fit special requirements. **Whitman & Barnes Div., United Drill & Tool Corp.**

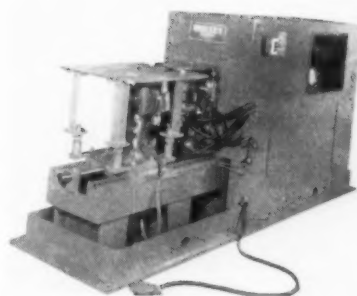
For more data circle No. 39 on postcard, p. 121

Horizontal seam welder fabricates furnace bonnets

Air operated, a new single-phase horizontal seam welder fabricates furnace bonnet sections. The parts rest and rotate conveniently on a horizontal adjustable table. The machine then proceeds to weld the pieces at a 144-ipm rate. The table moves up or down manually or in an indexing manner to accommodate special applications, e.g. cylin-

dric shapes. The main welding transformer is rated at 400-KVA. The resistance welder's pressure system can apply a maximum electrode force of 3000-lb under an air line pressure of 80-psi. The upper and lower electrode heads have silver contacts. It has a variable speed motor. *Sciaky Bros., Inc.*

For more data circle No. 40 on postcard, p. 121



Dual-purpose socket

A new socket fits square and hex nuts interchangeably. This means that a mechanic tightening a hex nut of 1/2-in. size can also fit his socket wrench on a square nut of 1/2-in. size without changing sockets. It cuts down the space, weight



and cost of one-half of the regular sockets in a socket set. The ten-point tools are now made in 1/2-in. square drive. They will soon be available in 1/4, 3/8, 3/4 and 1-in. drives. They fit any standard ratchet wrench of the right drive size. *The Wright Tool & Forge Co.*

For more data circle No. 41 on postcard, p. 121

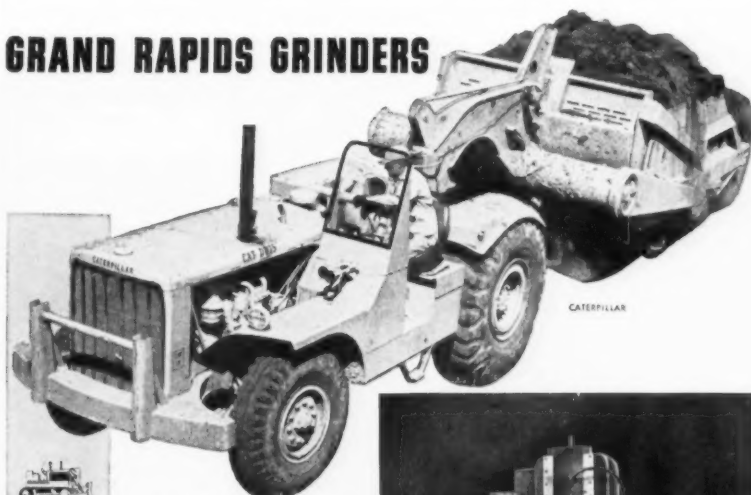
Crossing guard

An improved flangeway guard for railroad crossings provides a smooth and durable crossing on curves or straight track. It is easy to install, lasts as long as the rail and is of all-steel construction. The guard accommodates all new or used rail sizes. It requires no drilling; only a wrench is needed for installation. The crossing guard is particularly adaptable to all paved and industrial areas where rails are installed. Its rigid steel guard bar provides a smooth surface between tracks. *Kasle Steel Corp.*

For more data circle No. 42 on postcard, p. 121

FOUND WHERE WORLD FAMOUS TRACTORS ARE "BORN"

GRAND RAPIDS GRINDERS



CATERPILLAR



ALLIS-CHALMERS



CASE



DEERE



INTERNATIONAL HARVESTER

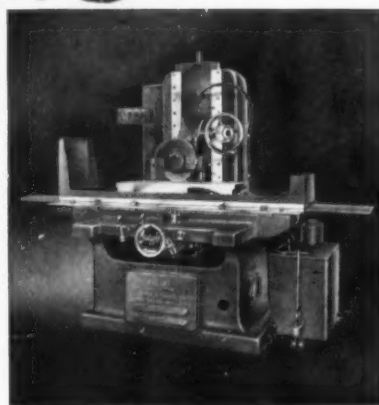


P. G. LATOURNEAU



MASSEY-HARRIS-FERGUSON

The makers of these famous tractors and allied heavy-duty equipment use Grand Rapids Grinders in their toolrooms. In fact, you'll find Grand Rapids Grinders wherever manufacturers place a premium on precision — because they're designed and built for lifetime precision grinding. Model No. 55, at right, offers such features as one-piece column and base for permanent, vibrationless alignment, wheel head with powered rapid vertical travel, hydraulically actuated cross feed and longitudinal travel table. And it's the fastest grinder of its size and type, with a variable table speed up to 125 fpm! If you're not already enjoying these standout features in your toolroom, a note on your letterhead will bring full details.



GRAND RAPIDS No. 55 HYDRAULIC FEED SURFACE GRINDER. Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head is 16". Preloaded ball bearing spindle greased for life. Spindle speed 1925 and 2500 rpm.

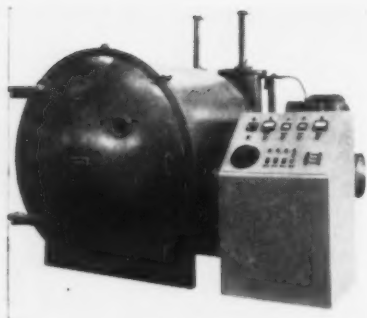


GALLMEYER & LIVINGSTON CO.

Write for full information.



400 STRAIGHT AVE., S.W. GRAND RAPIDS, MICHIGAN



Vacuum metallizing unit handles unusual conditions

This 72-in. high production metallizing unit has two 16-in. diffusion pumps of greater capacity than the three pumps in former models. A 6-in. booster pump backs up the diffusion pumps. As a result, pump-down to 0.5-microns (normal "flashing" pressure) is now six minutes or less. Thus, the pumping system readily handles unusual operating conditions such as heavy

outgassing from the work or from contaminated chamber walls. Operated by push-button sequence, the unit has interlocked control circuits; this allows foolproof performance even with ordinary skilled labor. The vacuum manifold contains solenoid-controlled air-operated poppet valves. These are all remotely operated from a control console at the front of the unit. *F. J. Stokes Corp.*

For more data circle No. 43 on postcard, p. 121

POPE engineers and builds 20,000 Different motorized and Belt Driven SPINDLES one of which may be just the one to LOWER YOUR PRODUCTION COST

Here are only a few representative Pope Precision Spindles:



FOR SURFACE GRINDING

POPE 1, 2 and 3 HP Totally Enclosed 1800 and 3600 RPM Motorized, Cartridge Type Spindles with double row cylindrical roller bearings of enormous capacity for superior performance and long life, plus separate thrust bearings for no endwise movement of the shaft.

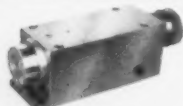


FOR HEAVY DUTY MILLING AND GRINDING

POPE 1/2 to 100HP Direct Motorized Spindles operate in any position — flanged or tapered noses — equipped with super-precision, double-row roller bearings and preloaded ball thrust bearings. Top quality performance is assured on skin milling, grinding, boring and other operations as well as milling.

FOR TOOL AND CUTTER GRINDING

POPE Super-Precision 1 HP, 3600 RPM Motorized Tool and Cutter Grinder Clearance Angle Swivelling Heads provide angular adjustment in a vertical plane. They pay for themselves in time saved. Cup wheels can be used for practically all clearance angles.



FOR BORING ROUND HOLES WITHIN MILLIONTHS OF AN INCH

POPE Heavy Duty Boring Spindles assure smooth, chatter free, continuous high production of accurate parts. Belt driven or motorized, in a wide range of horsepower and speeds.



FOR INTERNAL GRINDING

POPE Precision Internal Grinding Spindles have the super-precision bearings to withstand both axial and radial loads and to produce better finished ground holes. Their ability to take heavy cuts means increased production. Wheel life is increased, too. For Bryant, Cincinnati, Excello, Heald, Landis and Norton Grinders.

FOR HIGH CYCLE GRINDING AND MILLING

POPE Super-Precision, High Frequency, Heavy Duty Spindles are available for speeds up to 100,000 RPM. They are unequalled for low cost maintenance, long life, trouble-free operation and rugged ability to cut metal fast.



greases and most chemicals. According to the testers, the water absorption factor is almost as low as for high quality rubber tires. It resists many acids, alkalies and solvents. Users report that they provide very good service under the worst floor conditions. Where temperature is a factor, they outperformed all other materials tested—except metal. Of course, the wheels are spark-proof. They come in sizes 3 to 12-in., with alloy steel roller bearings. *The Fairbanks Co.*


For more data circle No. 44 on postcard, p. 121

POPE
PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

No. 116

Send us your specifications and get prompt quotations on the one best Spindle for you out of the 20,000 different Precision Spindles that bear the name "POPE."



Highlights
of
modern
living

Beautiful

flatware of

Superior Stainless

STRIP STEEL

From the kitchen, to the finest tables in the land! That's the progress of modern stainless flatware—thanks to new-day design and finish. • Superior Stainless Strip Steel is chosen widely for flatware applications because of its *superior uniformity and fabricating ease*. From our bright coils come stainless pieces practical for the hardest service, handsome enough for Sunday best!

Superior Steel

CORPORATION

CARNEGIE, PENNSYLVANIA

SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER I—Decorative, Corrosion-Resistant Finishing with Iridite

Chromate conversion coatings are well known and accepted throughout industry as an economical means of providing corrosion protection, a decorative finish or a good paint base for non-ferrous metals. However, continued developments are so rapid and widespread that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this digest of current information; to bring you up to date on the many ways in which you can combine salable appearance with durability in one finish at a competitive price advantage. Report II on paint base, corrosion-resistant finishes and Report III on chemically polished, corrosion-resistant finishes are available on request.

First, as a basis for this discussion, a "decorative" finish is considered as any chromate film that is used as a final finish in itself. It may be truly decorative in that its sole purpose is to enhance the beauty of the product. For example, a bright chrome-like finish or a pleasing bronze appearance are among the many effects that can be obtained. It may be functionally decorative in that it reduces reflectivity for camouflage purposes or provides a means of color-coding parts. But, in all cases, the Iridite films protect the metal against corrosive attack.

Iridite finishes are now available for all commercial forms of the more commonly used non-ferrous metals, including zinc, cadmium, aluminum, magnesium, silver, copper, brass and bronze. These films can produce a wide variety of pleasing appearances. The basic colors of the Iridite coatings are grouped below by metals.

ZINC and CADMIUM: Metallic bright, light iridescent, iridescent yellow, bronze, olive drab.

COPPER, BRASS, BRONZE: Metallic bright, yellow.

ALUMINUM ALLOYS: Clear, iridescent yellow, brown.

MAGNESIUM ALLOYS: Metallic bright, iridescent yellow-red, brown.

SILVER: Metallic bright.

In addition, many films can be modified by bleaching or by dyeing. Among the dye colors available are various shades of red, yellow, green, blue or black.

Depending upon the metal and the Iridite used, corrosion resistance of clear and bright films ranges from mild passivity to as high as 500 hours in salt-spray; on heavier dark films, salt-spray resistance ranges from approximately 100 to 1000 hours.

It is this combination of decorative and corrosion resistant properties that accounts for the widening use of Iridite finishes. For example, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, a combination of lustrous chemical polishing of the as-cast surface of zinc die castings and good resistance to corrosion. Further, in many cases,

WHAT IS IRIDITE?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

sizeable savings in the cost of buffing and electroplating are realized.

On many steel parts, a simple system of zinc or cadmium plate and bright Iridite is used instead of more costly electroplated finishes to provide a bright, decorative and protective finish with tremendous savings in material, equipment and labor.

In finishing aluminum, where corrosion resistance or paint adherence is the prime consideration, the aircraft industry has all but abandoned the anodizing process in favor of recently developed chromate conversion coatings, among them Iridite #14 and #14-2 (Al-Coat). These formulations and their method of application can be varied to retain the original metallic appearance while providing acceptable corrosion resistance, or to produce a fully colored brown finish that offers exceptional corrosion protection. Again, time and manpower savings are astounding—one company saved at least \$15,000 a year on maintenance of racks alone and another \$40,000 on materials and labor in only nine months. In addition, of course, hundreds of thousands of dollars are saved by eliminating the need for expenditures for generators, heating equipment and racks.

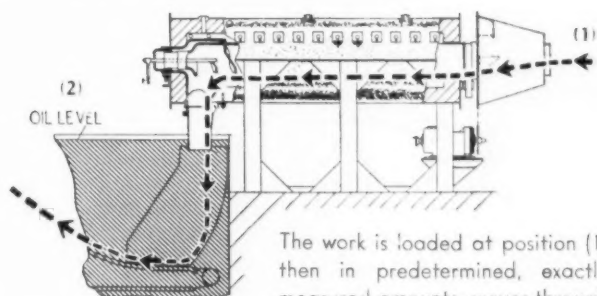
Iridites are widely approved under both Armed Services and industrial specifications because of performance, low cost and savings of materials and equipment.

In planning or designing, you should consider the many other characteristics of Iridite finishes which may enter into the specific problem. In addition to having decorative and protective functions, these chromate coatings form an excellent base for organic finishes and bonding compounds. They have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

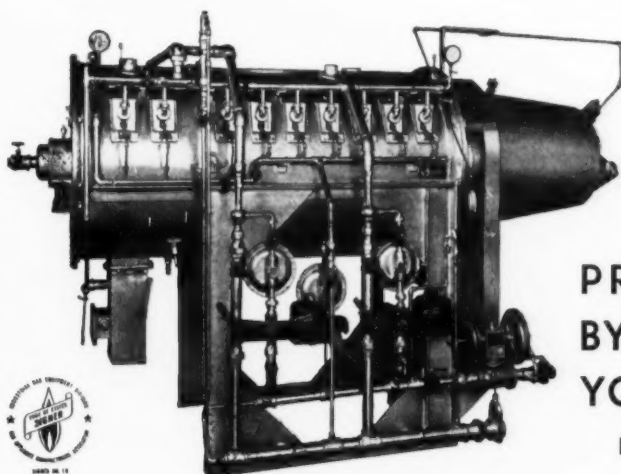
You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product requires the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 E. Monument Street, Baltimore 5, Maryland.

IT IS NOW POSSIBLE TO PUT YOUR HEAT TREATING FURNACE IN
YOUR PRODUCTION LINE BY INSTALLING

AGF AUTOMATIC CONTINUOUS FURNACES



The work is loaded at position (1) then in predetermined, exactly measured amounts, moves through the furnace and into the quench tank (2) thence out by conveyor to heating, washing, tempering or any desired further treatment.



AGF AUTOMATIC CONTINUOUS FURNACE

Model 136 utilizes a Rotary Retort and has a heat treating capacity of 150 to 400 pounds per hour. Larger models are available for higher production needs and single installations are now able to handle up to 1000 pounds of steel products per hour with a guarantee of uniform clean hardening.

A completely new combustion system and other engineering features permit processing ferrous or non-ferrous parts at temperatures from 600°F. to 1850°F. Clean hardening, ammonia-gas case hardening, light case carburizing of steel parts or the heat treating of aluminum parts can be accomplished with equal ease and without any modification of the furnace.

"PIONEER inventors, designers and builders of industrial heat treating and gas tempering equipment since 1878."

PROOF IS PROVIDED BY MANY USERS, THAT YOU SHOULD CONSIDER

PRODUCTION LINE HEAT TREATING

AGF Engineers and Metallurgists have kept up with the trend to continuous automatic production. As a result it is possible to point to several important installations that are successfully providing "round-the-clock" output of startling volume.

It costs nothing to present your heat treating production problem to a qualified AGF representative in your area.



AMERICAN GAS FURNACE CO.

1004 LAFAYETTE ST., ELIZABETH 4, N. J.

Please send full descriptive material upon the AGF Model 136 Automatic Furnace.

My Name is Title

Company

Street City

I want to heat treat lbs. per hr. of

- ☐ I will send samples for your recommendation.
☐ Please have your representative call at no obligation to my company.

STEEL MEN!

FIGURE THE VALUE OF A BALANCED TANK

THE ideal glass furnace is one which can be counted on to wear out evenly and uniformly, giving the operator the full potential value of every brick in every part of the tank.

Until a few years ago, however, such a tank was considered an obvious impossibility.

When Corhart Electrocast was first offered to the trade as a much superior glasshouse refractory, our new customers began using it to strengthen those portions of their furnaces which had always been the limiting factors in producing life.

This idea proved successful, but at the end of the fire, the Corhart was usually in such good shape that the natural result was to fortify the next weakest portions. This step-by-step process has now been followed through to its logical conclusion by most of our original customers: namely, the gradual increase of Corhart to a point where the life of the

former weak portions approximates the life of the easy-service portions. This ideal construction, with the judicious use of Corhart Electrocast, has led to what is termed "The Corhart Balanced Unit."

A Corhart Balanced Unit can be fabricated for a surprisingly small percentage increase in first cost. This percentage increase represents only a fraction of the increased life and total tonnage output.

Corhart Balanced Tanks are now widely used throughout the industry. More than sixty are now in service—and this, of course, is in addition to the dozens of installations in which Corhart is used as a spot refractory. Write us today for the complete facts and figures on a Corhart Balanced Tank of your company's type. Full designs, specifications and quotations will be gladly furnished, without obligation. Address: Corhart Refractories Co., Incorporated, 16th & Lee Sts., Louisville, Ky.



**CORHART
ELECTROCAST
REFRACTORIES**

THIS ad appeared more than 25 years ago—in January, 1932. At that time Corhart Electrocast was still so new in the glass industry that only a few of the most progressive companies dared buy it. It was, *and still is*, "one of the world's highest-priced refractories". Yet now its use is practically universal . . .

Today Corhart 104 is new in the steel industry. Like its glass-industry counterpart, it too is "one of the world's highest-priced refractories". Yet it offers open-hearth furnace operators the same opportunities for greater production and lower costs that Corhart Electrocast brought to the glass industry.

May we send you all the facts? Address: Corhart Refractories Co., Incorporated, 1620 West Lee Street, Louisville 10, Kentucky, U.S.A., SPring 8-4471.



**CORHART 104
ELECTROCAST
REFRACTORY**

The words "Corhart" and "Electrocast" are registered Trade Marks which indicate manufacture by Corhart Refractories Company, Incorporated, Corhart Refractories Co., Incorporated, 1600 West Lee Street, Louisville 10, Kentucky, U.S.A.—Telephone SPring 8-4471.

The Iron Age SUMMARY...

Steel market is catching its second wind . . . Customers are settling down to a normal pattern of ordering . . . Automotive slow, but showing signs of coming to life.

Brighter Picture . . . The steel market is catching its second wind. Now that fears of a sharp let-down have been discounted, steel users are sticking to their normal buying patterns. Even automotive is showing tentative signs of a steadier buying rate.

Some mills are still booking more steel than they are shipping. Mills heavy on sheet and strip capacity have extra tonnages to dispose of. But small users are happy for the windfall. Orders for hot-rolled sheet are holding up well.

Best barometer of continued strong demand is that the mills are operating at near-capacity levels. A fall-off in basic steel production is looked for in the second and third quarters, followed by a strong pickup in the last three months. Prediction for the year: ingot production of 117 million tons, equal to the 1955 record.

Auto Antics . . . Automakers apparently are nearing the cutoff point in their drive to reduce inventories. One worrisome rumor is that a member of the Big Three is cutting to the bone, intending to let the mills act as a quick-service warehouse in case it needs steel in a hurry. But the mills are not likely to hold still for this, and the automaker could find himself out on a long limb in a pinch.

Adding to the general confusion on Detroit's intentions is the indication given to one mill that automotive steel orders for April will be up. This could be a hint of inventory rebuilding to get set for a spring upturn in car sales.

Talk of easiness in plate and structurals applies only to lighter products. Contractors are still settling for two-year delivery promises on heavy structurals. Heavy plates are still in a precious-gem category.

Export Demand . . . Meanwhile, steel order backlogs this week are down only slightly from a month ago on an industrywide basis. Some mills have added to backlogs in the last several weeks. In the background is the continued strong outlook for defense, heavy equipment, and plant investment.

Export shipments could be a lot heavier if the mills wanted to accept the business. Unfortunately, the strongest export demand is for plate, structurals, and other products also in short supply here. Foreign mills also could use more sheet and tinplate. But the mills are not going after this business. Only nominal shipments are going overseas. This demand could act as a backstop should anything serious happen to the domestic market.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,496	2,509	2,561	2,320
Ingot Index				
(1947-1949=100)	155.4	156.2	159.4	150.0
Operating Rates				
Chicago	94.0	94.0*	97.0	98.5
Pittsburgh	99.0	100.0	100.0	103.0
Philadelphia	105.0	104.5	104.0	103.0
Valley	97.0	97.0	100.0	97.0
West	103.0	102.5*	100.0	99.5
Buffalo	105.0	105.0	105.0	105.0
Cleveland	95.0	95.0*	99.0	105.0
Detroit	102.0	102.0	105.0	103.0
S. Ohio River	87.0	87.0	104.0	88.0
South	95.0	96.5	95.0	99.0
Upper Ohio R.	103.0	108.0*	103.0	105.0
St. Louis	99.5	100.0	96.0	90.0
Northeast	31.0	31.0	48.0	83.0
Aggregate	97.5	98.0	100.0	100.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Month Ago	Year Ago
Composite price			
Finished Steel, base	5.622	5.622	5.622
Pig Iron (Gross Ton)	\$62.90	\$62.90	\$62.90
Scrap, No. 1 hvy (Gross ton)	\$53.83	\$55.50	\$60.83
Nonferrous			
Aluminum ingot	27.10	27.10	27.10
Copper, electrolytic	34.00	36.00	36.00
Lead, St. Louis	15.80	15.80	15.80
Magnesium ingot	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00
Tin, Straits, N. Y.	102.50	102.50	99.50
Zinc, E. St. Louis	13.50	13.50	13.50

*Revised

Iron Ore Advanced 60c a Ton

Boost is addition to steelmaking costs . . . Freight and labor costs are mentioned by ore supplier . . . Prices will be firm through '57 lake shipping season.

♦ **HIGHER IRON** ore prices have added more fuel to the fire under the simmering steel price pot.

The increase of 60¢ a ton is just one more addition to steel production costs. Earlier cost boosts were in ferroalloys, coal, freight, and the three-cents-an-hour increase to steel workers on Jan. 1. In addition, scrap costs, while declining in recent weeks, are still at high levels.

With the exception of extra charges and a few isolated base price increases, producers have held the price line set last summer. Chances are that a general base price increase will be held in abeyance until next summer, when steel labor is due for another wage boost.

The one offsetting factor in the price picture is President Eisenhower's plea for moderation in price and wage advances as a gesture toward control of inflation.

Cost increases move in vicious circles. In announcing the new iron ore prices, John S. Wilber, Vice-President—Sales, Cleveland-Cliffs Iron Co., cited increased transport charges of 37¢ a ton in '56. He noted the railroads are asking for further increases and a probable increase in lake freight charges is over the horizon. In addition the company's labor costs have advanced with a further boost coming this July.

The new Cleveland-Cliffs base prices, effective Jan. 30, will be firm for shipments throughout the 1957 lake shipping season. The company will absorb increases made during the season in upper lake railroad freight rates, lake vessel rates, handling and unloading charges, taxes, and labor cost.

Prices per gross ton for stand-

ard grades of iron ore containing 51.50 pct iron natural, delivered at rail of vessel, lower lake ports, are as follows:

Mesabi range non-bessemer	\$11.45
Mesabi range bessemer	11.60
Old range non-bessemer	11.70
Old range bessemer	11.85
Openhearth lump	12.70
High Phos.	11.45

Meanwhile the steel products market continues to show two faces. If you're talking about plates, shapes or pipe it's strictly a seller's market. However, in the field of sheet, strip, and bar it's the suppliers who are out beating the bushes.

And, in some cases, they're beating some pretty distant bushes. There are reports that a large mid-western supplier of sheet to the automotive firms is searching for orders in the Delaware Valley.

As sheet market sours some mills continue to roll light plate. One large eastern mill is offering sheet customers increased tonnages in the second quarter. Some are glad to get the tonnage. Others are accepting only part of the windfall.



Purchasing Agent's Checklist

MARKETING: Roadbuilding equipment makers start to roll . . . p. 62

RAW MATERIALS: Would there be scrap shortage in event of a national emergency? . . . p. 66

MANUFACTURING: New developments in plastic coated steel pipe . . . p. 67

TECHNICAL: Cast titanium parts are approaching the commercial stage . . . p. 102

SHEET AND STRIP . . . Cold-rolled sheet demand is off at Pittsburgh, although hot-rolled is still strong. One mill will have a h-r carryover from March and April orders are coming in at a good rate. Automotive tonnages of c-r sheet for April are up, according to one mill.

A large eastern sheet producer is offering customers increased tonnage in second quarter with request that the offer not be considered a permanent one. Some buyers are accepting all the additional, others are taking only some. Galvanized and coated sheet are both off in the Philadelphia market.

Demand is slow at Detroit for both sheet and strip. At present there are no signs of improvement.

BARS . . . Slowness in demand at Detroit has enabled some mills to catch up on slight backlogs in h-r forging bars.

Bar market is off at Philadelphia. Cold-finished bars are very loose with h-r bars available on 4-5 weeks' delivery. Alloy bars are also weak.

PIPE AND TUBING . . . Pittsburgh producer of oil country tubular goods is booked solid through the second quarter. It could be the third quarter, if the mill would accept orders that far ahead. Mechanical tubing is stronger, but boiler tube sales have been hurt by the shortage of plate for boilermaking.

Electricweld and seamless pipe are tight at Philadelphia. However, butt-weld is easy. One producer reports some sizes may be obtained quickly because mills have holes in rolling schedules. In general, deliveries are quoted at four weeks.

WIRE PRODUCTS . . . A seasonal pickup in merchant wire products is reported at Pittsburgh. Construction wire products are in good demand. Manufacturers wire is still slow.

Same situation—some activity in merchant products, little in manufacturers—exists at Philadelphia and Detroit.

EXTRA INCREASES: Youngstown Sheet and Tube Co. on hot-rolled merchant and special quality bars, small shapes and concrete reinforcing bars. Also on h-r alloy bars, billets, blooms, and slabs, as well as rounds and hexagons $\frac{3}{4}$ to 1 in. Jones & Laughlin Corp. on h-r sheets, h-r plates and floor plates and concrete reinforcing bars.

On the West Coast new large construction projects, now coming up for bid, are expected to put pressure on mills for reinforcing bars.

Comparison of Prices

(Effective Feb. 5, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Feb. 5 1957	Jan. 29 1957	Jan. 8 1957	Feb. 7 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.325¢
Cold-rolled sheets	5.75	5.75	5.75	5.325
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.85
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.29
Plate	4.87	4.87	4.87	4.52
Plates, wrought iron	10.40	10.40	10.40	10.40
Stainl's C-R strip (No. 302)	60.00	60.00	60.00	44.50

Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	\$9.95	\$9.95	\$9.95	\$9.05
Tin plates, electro (0.50 lb.)	8.65	8.65	8.65	7.75
Special coated mfg. ternes	9.20	9.20	9.20	7.85

Bars and Shapes: (per pound)				
Merchant bars	5.075¢	5.075¢	5.075¢	4.65¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 302)	43.25	43.25	43.25	38.25
Wrought iron bars	11.50	11.50	11.50	11.50

Wire: (per pound)				
Bright wire	7.20¢	7.20¢	7.20¢	6.25¢

Rails: (per 100 lb.)				
Heavy rails	\$5.075	\$5.075	\$5.075	\$4.725
Light rails	6.00	6.00	6.00	5.65

Semifinish Steel: (per net ton)				
Rerolling billets	\$74.00	\$74.00	\$74.00	\$68.50
Slabs, rerolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	96.00

Wire Rod and Skelp: (per pound)				
Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225

Finished Steel Composite: (per pound)				
Base price	5.622¢	5.622¢	5.622¢	5.174¢

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite
Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

STAINLESS STEEL

—To identify producers, see Key on P. 170—

Producing Point	Basic	Fdy.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. B6	64.50	65.00	65.50	66.00	.....
Birmingham R3	58.50	59.00*	.....	.....	.....
Birmingham W9	58.50	59.00*	63.00	.....	.....
Birmingham U4	58.50	59.00*	63.00	.....	.....
Buffalo R3	62.50	63.00	63.50	64.00	.....
Buffalo H1	62.50	63.00	63.50	.....	.....
Buffalo W6	62.50	63.00	63.50	64.00	.....
Chester P2	64.50	65.00	65.50	.....	.....
Chicago I4	62.50	63.00	63.50	64.00	.....
Cleveland A5	62.50	63.00	63.50	64.00	67.50†
Cleveland R3	62.50	63.00	63.50	64.00	.....
Duluth I4	62.50	63.00	63.50	64.00	67.50†
Erie I4	62.50	63.00	63.50	64.00	67.50†
Everett M6	65.00	65.00	65.00	.....	.....
Fontana K1	70.50	71.00	.....	.....	.....
Genova, Utah C7	62.50	63.00	63.50	64.00	.....
Granite City G2	64.40	64.90	65.40	.....	.....
Hubbard V1	.....	.....	63.00	.....	.....
Leve Star L3	58.50†	59.00†	.....	.....	.....
Midland C11	62.50	.....	.....	.....	.....
Minnequa C6	64.50	65.00	65.50	.....	.....
Monessen P6	62.50	.....	.....	.....	.....
Neville Is. P4	62.50	63.00	63.50	64.00	67.50†
N. Tensawanda T1	.....	63.00	63.50	64.00	.....
Pittsburgh U1	62.50	63.00	63.50	64.00	.....
Sharpsville S3	62.50	63.00	63.50	64.00	.....
Sa. Chicago R3	62.50	63.00	63.50	64.00	.....
Swedeland A2	64.50	65.00	65.50	66.00	70.50
Toledo I4	62.50	63.00	63.50	64.00	.....
Tray, N. Y. R3	64.50	65.00	65.50	66.00	70.50
Youngstown Y1	.....	63.00	63.50	.....	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, \$2 per ton for 0.5 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel.
* Add \$1.00 for 0.31-0.40 pct phos. † Intermediate low phos.
‡ Add \$1.00 for 0.31 to 0.50 pct phos.

Silvery Iron: Buffalo, H1, \$72.50; Jackson, J1, I4 (Globe Div.), \$71.50; Niagara Falls (15.01-15.50), \$59.50; Kokuk (14.01-14.50), \$110.00; (15.51-16.00), \$105.00. Add \$1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 14 pct. Add 75¢ for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under 10 pct phos.): \$64.00. Add \$1.00 premium for all grades silvery 8 pct to 14 pct.

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingot, reroll.	21.25	22.75	22.25	24.25	—	26.00	38.25	31.00	35.50	—	16.00	27.75	16.25
Slabs, billets	26.00	29.00	27.00	30.25	30.75	32.00	47.50	38.50	44.75	—	20.75	—	21.00
Billets, forging	—	35.00	35.75	36.50	39.50	39.00	59.75	45.25	53.50	30.75	27.25	27.75	27.75
Bars, struct.	—	41.25	42.50	43.25	46.25	46.00	70.25	53.25	62.25	36.25	32.50	33.00	33.00
Plates	—	43.25	44.50	45.50	48.00	48.75	73.75	57.50	67.00	38.75	33.75	35.50	34.50
Sheets	46.75	47.25	49.25	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Strip, hot-rolled	34.50	37.50	35.75	39.00	—	42.50	64.50	51.50	61.00	—	29.75	—	30.75
Strip, cold-rolled	43.25	47.25	45.75	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Wire CF; Rod HR	—	39.25	40.25	41.00	44.00	43.75	64.75	50.50	59.25	34.50	31.00	31.50	31.50
			40.50	41.25			67.00	51.00	59.50				

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; Vandergrift, Pa., U1; Washington, Pa., W2, J2; Baltimore, E7; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., I2; Ft. Wayne, J4; Philadelphia, D3.

Strip: Midland, Pa., C11; Waukegan, Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leeburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Harrison, N. J., D3; Youngstown, C3; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (plus further conversion extras); W1 New Bedford, Mass. (.25¢ per lb higher); R6; Gary, U1 (.25¢ per lb higher).

Bar: Baltimore, A7; S. Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1; F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; S. Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5; Ft. Wayne, J4; Philadelphia, D3; Detroit, R3; Gary, U1.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Syracuse, C11; Bridgeville, U2.

Structural: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11; S. Chicago, U1.

Plates: Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., I2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15; Philadelphia, D3; Vandergrift, Pa., U1; Gary, U1.

Forging billets: Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11; Detroit, R3; Munhall, Pa., S. Chicago, U1.

Midwest Leads Market Drop

Chicago market drops in two stages . . . Mills bank on heavy inventories to push price down . . . But Pittsburgh and East hold relatively firm . . . West Coast is down.

♦ A TWO-STAGE drop in Chicago kicked the down-spinning scrap market another big step lower in the Midwest.

Although the market in the East Coast and Pittsburgh areas continued firm, the Midwest found dealers in full flight. Whether they were panicked by a real collapsing market or some unusually strong scare talk is a matter of opinion. The end result, nevertheless, is a severely sagging market.

A Chicago buyer entered the market at one point in the week, dropping the price \$4. A subsequent purchase later in the week dropped it even further. There was little resistance from the trade, which was ready to sell at the new prices.

What prompted the strong declines in the sinking areas?

For one thing, mills indicate they have a full 90-day inventory, which they want to cut down, rather than build up. Secondly, talk of a substantial drop in second quarter operations has had more of an effect in the Midwest.

The threat of lower operations in the East has not had the same effect. Eastern mills have less emphasis on flat-rolled products. Easing of cold-rolled sheets has little effect in the East, where steel operating rates are still well over 100 pct of capacity.

Major declines also occurred on the West Coast. Although export is strong, mills have long inventories and docks are loaded with more than enough scrap to meet export commitments to Japan.

Pittsburgh . . . The market here has a weak look, although mill buying has checked the price slide for the moment. A second district mill and a mill on the fringe of the district bought openhearth scrap at the estab-

lished prices. In addition, brokers are reported still working on old orders. However, low prices paid for production scrap and the reports of a coming slowdown in mill operations are having a weakening effect on the dealer market. Low phos is down \$1 on a mill purchase and cast grades slipped \$2 to \$3.

Chicago . . . Prices here broke twice in the past week. The effect was to take the list down generally about \$5. Turnings show greater stability, but railroad and heavy melting items slipped heavily. Broker buying dried up following the second break. By the following Monday, broker offers to buy No. 1 heavy melting at \$18 were generally reported.

Philadelphia . . . A mill purchase of No. 1 heavy melting last week at \$59 was not large enough to warrant an upward price revision in view of the market's general softness. The price remained at \$58. This market received some unexpected export activity resulting from the New York tugboat strike. Two partially loaded ships in New York harbor were shunted here to finish loading. Test of the market's strength is expected after these cargoes are bought and covered, in about a week.

New York . . . Situation is steady, particularly in steelmaking grades. Scrap is moving into dealers' yards at a good clip. Export demand is holding up. And small sales have been made to mills in an adjacent district at going prices. There is some indication of slight weakening in cast grades. No. 1 machinery, mixed yard and charging box are down \$1 on appraisal.

Detroit . . . Lack of activity continues to reflect increasing softness of the market. Local mills are in no hurry to buy dealer scrap. There is general anticipation of lower prices to come. One mill is expected to come into the market late this week. This should establish the market level. Steelmaking grades are off \$3 on appraisal of the market.

Cleveland . . . The Valley market declined further with a sale of No. 1 heavy melting at \$54. Secondary grades are holding strength, based to some extent on broker buying for older, high priced orders. Additional factory lists were purchased at about \$1 under first lists and are being shipped as No. 1 grade where orders are available. A major local foundry has purchased plate scrap at considerably over No. 1 to avoid drying up sources.

Birmingham . . . All segments of the market continue dull in this district. Most of the high priced orders for openhearth scrap have now been delivered and brokers anticipate one large consumer will soon return to the market. Prices are expected to be from \$2 to \$3 under the last buy. Electric furnace grades are barely holding their own, with some items lower.

St. Louis . . . Nearly every item in this market is off. Steel mills have adjusted their prices downward, since they are interested now in keeping their inventories down. Shipments have already slowed following recent declines and mills expect that reductions will cut shipments a full 35 pct. Foundry grades are also off. Prices in Jan. 31 issue should have been: Machine shop turnings, \$35 to \$36; east iron borings, \$37 to \$38; and shoveling turnings, \$37 to \$38.

Cincinnati . . . The market dropped \$5 on primary grades with announcement of monthly buying program by an area mill. Additional tonnage may be purchased by a second mill at somewhat higher prices.

Buffalo . . . The market here is unchanged for the most part. Recent declines have brought the market to the level of adjacent areas. But activity is slow, and the market has some signs of weakness.

Boston . . . A new England mill purchase dropped steelmaking grades \$1, in a generally inactive market. Export continues slow. Secondary steelmaking grades are also off somewhat. Turnings follow the general downward trend.

West Coast . . . Prices dropped from \$4 to \$7 per ton in all West Coast market areas. And they are soft at these levels. Mills say they have more than enough inventory, and are holding off buying. Exporting to Japan continues brisk, however. But there is plenty of scrap on the docks to meet export commitments.



How A. O. Smith Corporation makes a "Diagonal Tie" with USS GERRARD Round Steel Strapping

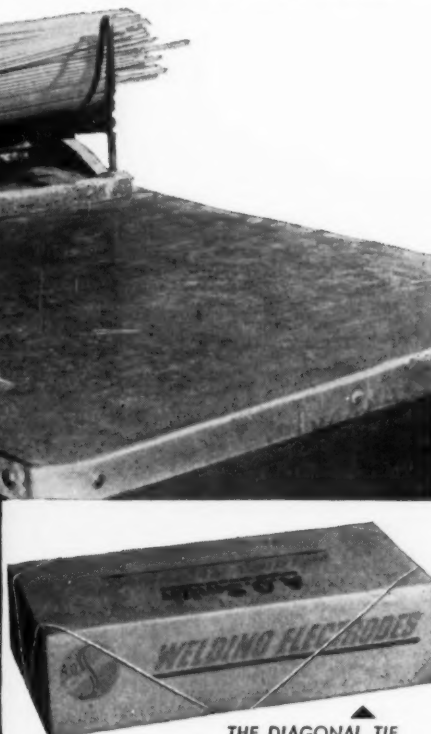
This unique diagonal tying method was designed by the Plant Superintendent of the Welding Products Division, A. O. Smith Corporation, Milwaukee, Wisconsin, in cooperation with a USS Gerrard sales representative.

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age and lost pieces, the "Diagonal Tie" makes a very favorable impression on customers.

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Scrap Prices (Effective Feb. 5, 1957)

Pittsburgh

No. 1 hvy. melting	\$54.00 to \$55.00
No. 2 hvy. melting	48.00 to 49.00
No. 1 dealer bundles	54.00 to 55.00
No. 1 factory bundles	57.00 to 58.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	39.00 to 40.00
Mixed bor. and ms. turn.	39.00 to 40.00
Shoveling turnings	43.00 to 44.00
Cast iron borings	43.00 to 44.00
Low phos. punch's plate	58.00 to 59.00
Heavy turnings	49.00 to 50.00
No. 1 RR hvy. melting	56.00 to 57.00
Scrap rails, random lgth.	67.00 to 68.00
Rails 2 ft. and under	70.00 to 71.00
RR steel wheels	66.00 to 67.00
RR spring steel	66.00 to 67.00
RR couplers and knuckles	66.00 to 67.00
No. 1 machinery cast.	56.00 to 57.00
Cupola cast.	50.00 to 51.00
Heavy breakable cast.	48.00 to 49.00

Chicago

No. 1 hvy. melting	\$49.00 to \$50.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 dealer bundles	50.00 to 51.00
No. 1 factory bundles	54.00 to 55.00
No. 2 bundles	40.00 to 41.00
Machine shop turn.	34.00 to 35.00
Mixed bor. and turn.	36.00 to 37.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	36.00 to 37.00
Low phos. forge crops	62.00 to 63.00
Low phos. punch's plate	58.00 to 59.00
Low phos. 3 ft. and under	57.00 to 58.00
No. 1 RR hvy. melting	56.00 to 57.00
Scrap rails, random lgth.	67.00 to 68.00
Rerolling rails	69.00 to 70.00
Rails 2 ft. and under	71.00 to 72.00
Locomotive tires cut	59.00 to 60.00
Cut bolsters & side frames	59.00 to 60.00
Angles and splice bars	64.00 to 65.00
RR steel car axles	78.00 to 80.00
RR couplers and knuckles	58.00 to 59.00
No. 1 machinery cast.	51.00 to 52.00
Cupola cast.	45.00 to 46.00
Heavy breakable cast.	44.00 to 45.00
Cast iron brake shoe	43.00 to 44.00
Cast iron wheels	53.00 to 54.00
Malleable	67.00 to 68.00
Stove plate	44.00 to 45.00
Steel car wheels	58.00 to 59.00

Philadelphia Area

No. 1 hvy. melting	\$57.00 to \$58.00
No. 2 hvy. melting	49.00 to 50.00
No. 1 dealer bundles	57.00 to 58.00
No. 2 bundles	47.50 to 48.50
Machine shop turn.	41.00 to 42.00
Mixed bor. short turn.	43.00 to 44.00
Cast iron borings	43.00 to 44.00
Shoveling turnings	45.00 to 46.00
Clean cast chem. borings	49.00 to 50.00
Low phos. 5 ft. and under	62.00 to 63.00
Low phos. 2 ft. and under	64.00 to 65.00
Low phos. punch's	64.00 to 65.00
Elec. furnace bundles	60.00 to 61.00
Heavy turnings	53.00 to 54.00
RR steel wheels	71.00 to 72.00
RR spring steel	71.00 to 72.00
Rails 18 in. and under	80.00 to 81.00
Cupola cast.	53.00 to 54.00
Heavy breakable cast.	58.00 to 59.00
Cast iron car wheels	64.00 to 65.00
Malleable	66.00 to 67.00
Unstripped motor blocks	44.00 to 45.00
No. 1 machinery cast.	60.00 to 61.00

Cleveland

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 dealer bundles	51.00 to 52.00
No. 1 factory bundles	52.00 to 53.00
No. 2 bundles	40.00 to 41.00
No. 1 busheling	51.00 to 52.00
Machine shop turn.	32.00 to 33.00
Mixed bor. and turn.	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Cut struct'l & plates, 2 ft. and under	58.00 to 59.00
Drop forge flashings	51.00 to 52.00
Low phos. punch's, plate	53.00 to 54.00
Foundry steel, 2 ft. and under	53.00 to 54.00
No. 1 RR heavy melting	56.00 to 57.00
Rails 2 ft. and under	73.00 to 74.00
Rails 18 in. and under	74.00 to 75.00
Railroad grate bars	39.00 to 40.00
Steel axle turnings	37.00 to 38.00
Railroad cast	57.00 to 58.00
No. 1 machinery cast.	55.00 to 56.00
Stove plate	51.00 to 52.00
Malleable	64.00 to 65.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$53.00 to \$54.00
No. 2 hvy. melting	49.00 to 50.00
No. 1 dealer bundles	53.00 to 54.00
No. 2 bundles	44.00 to 45.00
Machine shop turn.	31.00 to 32.00
Shoveling turnings	37.00 to 38.00
Cast iron borings	36.00 to 37.00
Low phos. plate	54.00 to 55.00

Buffalo

No. 1 hvy. melting	\$53.00 to \$54.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 busheling	53.00 to 54.00
No. 1 dealer bundles	53.00 to 54.00
No. 2 bundles	42.00 to 43.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	29.00 to 30.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	58.00 to 59.00
Scrap rails, random lgth.	63.00 to 64.00
Rails 2 ft. and under	67.00 to 68.00
RR steel wheels	65.00 to 66.00
RR spring steel	60.00 to 61.00
RR couplers and knuckles	65.00 to 66.00
No. 1 machinery cast.	49.00 to 50.00
No. 1 cupola cast.	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$42.00 to \$43.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 dealer bundles	42.00 to 43.00
No. 2 bundles	31.00 to 32.00
New busheling	42.00 to 43.00
Drop forge flashings	41.50 to 42.50
Machine shop turn.	28.00 to 29.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	31.00 to 32.00
Cast iron borings	31.00 to 32.00
Low phos. punch's, plate	42.00 to 43.00
No. 1 cupola cast.	51.00 to 52.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	\$48.00 to \$49.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 dealer bundles	48.00 to 49.00
No. 2 bundles	39.00 to 40.00
Machine shop turn.	33.00 to 34.00
Cast iron borings	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
No. 1 RR hvy. melting	54.00 to 55.00
Rails, random lengths	63.00 to 64.00
Rails 18 in. and under	74.00 to 75.00
Locomotive tires uncut	58.00 to 59.00
Angles and splice bars	58.00 to 59.00
Std. steel car axles	73.00 to 74.00
RR specialties	58.00 to 59.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoes	49.00 to 50.00
Stove plate	38.00 to 39.00
Cast iron car wheels	50.00 to 51.00
Rerolling rails	65.00 to 66.00
Unstripped motor blocks	40.00 to 41.00

Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$47.00 to \$48.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 dealer bundles	47.00 to 48.00
No. 2 bundles	36.50 to 37.50
No. 1 busheling	47.00 to 48.00
Elec. furnace, 3 ft. and under	52.50 to 53.50
Machine shop turn.	31.00 to 32.00
Mixed bor. and short turn.	32.50 to 33.50
Shoveling turnings	34.00 to 35.00
Clean cast chem. borings	36.00 to 37.00
No. 1 machinery cast.	47.00 to 48.00
Mixed cupola cast.	42.50 to 43.50
Heavy breakable cast.	46.00 to 47.00
Stove plate	41.00 to 42.00
Unstripped motor blocks	33.00 to 34.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$52.00 to \$53.00
No. 2 hvy. melting	44.00 to 45.00
No. 2 dealer bundles	41.00 to 42.00
Machine shop turn.	33.00 to 34.00
Mixed bor. and turn.	36.00 to 37.00
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	33.00 to 34.00
No. 1 machinery cast.	50.00 to 51.00
Mixed yard cast.	47.00 to 48.00
Charging box cast.	47.00 to 48.00
Heavy breakable cast.	49.00 to 50.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	\$44.00 to \$45.00
No. 2 hvy. melting	41.00 to 42.00
No. 1 dealer bundles	44.00 to 45.00
No. 2 bundles	36.00 to 37.00
No. 1 busheling	44.00 to 45.00
Machine shop turn.	34.00 to 35.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	27.00 to 28.00
Electric furnace bundles	52.00 to 53.00
Bar crops and plate	57.00 to 58.00
Structural and plate, 2 ft.	57.00 to 58.00
No. 1 RR hvy. melting	53.00 to 54.00
Scrap rails, random lgth.	64.00 to 65.00
Rails, 18 in. and under	66.00 to 67.00
Angles & splice bars	63.00 to 64.00
Rerolling rails	61.00 to 62.00
No. 1 cupola cast.	53.00 to 54.00
Stove plate	51.00 to 52.00
Charging box cast.	40.00 to 41.00
Cast iron car wheels	45.00 to 46.00
Unstripped motor blocks	44.00 to 45.00
Mashed tin cans	15.00 to 16.00
Elec. furnace, 2 ft. and under	50.00 to 51.00

Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	42.00 to 43.00
No. 1 dealer bundles	51.00 to 52.00
No. 2 bundles	38.00 to 39.00
Machine shop turn.	35.00 to 36.00
Mixed bor. and turn.	33.50 to 34.50
Shoveling turnings	37.00 to 38.00
Cast iron borings	33.50 to 34.50
Low phos. 18 in. & under	57.00 to 58.00
Rails, random lengths	63.00 to 64.00
Rails, 18 in. and under	73.00 to 74.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	44.00 to 45.00
Drop broken cast.	55.00 to 56.00

San Francisco

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	50.00
No. 1 dealer bundles	54.00
No. 2 bundles	38.00
Machine shop turn.	35.00
Cast iron borings	35.00
No. 1 RR hvy. melting	55.00
No. 1 cupola cast.	60.00

Los Angeles

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	51.00
No. 1 dealer bundles	54.00
No. 2 bundles	36.00
Machine shop turn.	34.00
Shoveling turnings	37.00
Cast iron borings	34.00
Elec. furn. 1 ft. and und r (foundry)	66.00
No. 1 RR hvy. melting	55.00
No. 1 cupola cast.	57.00

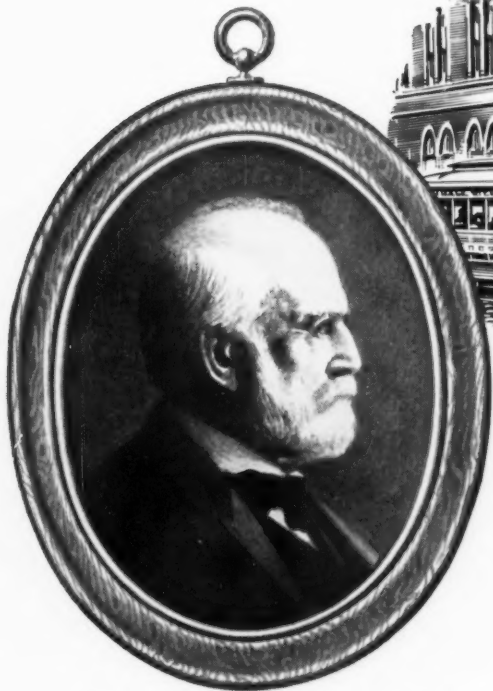
Seattle

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	51.00
No. 2 bundles	\$31.00 to 34.00
No. 1 cupola cast.	55.00
Mixed yard cast.	55.00

Hamilton Ont.

No. 1 hvy. melting	\$50.00
No. 2 hvy. melting	44.00
No. 1 dealer bundles	50.00
No. 2 bundles	38.00
Mixed steel scrap	42.00
Busheling	36.00
Bush, new fact., prep'd	48.00
Bush, new fact., unprep'd	44.00
Machine shop turn.	28.00
Short steel turn.	31.00
Mixed bor. and turn.	25.00
Rails, rerolling	56.00
Cast scrap	50.00

GREAT MOMENTS IN THE HISTORY OF IRON AND STEEL MAKING



COOPER UNION . . . "was to open the avenues of scientific knowledge to the youth of our city and country, and so unfold the volumes of nature that the young may see the beauties of creation, enjoy its blessings" . . . This is the seventeenth in a series of outstanding inventions and developments that have contributed to the progress of the iron and steel industry.

1856

Cooper Union

Abram S. Hewitt

He consulted his partner in the Trenton Iron Works, Abram S. Hewitt, on the possibility of using wrought iron beams in the new building. Hewitt began experiments based upon rail making, with an objective of producing beams about 7 inches deep. New machinery was devised, for none existed which would roll flanged beams 7 inches in a horizontal section. The result was the first "universal mill", which in the words of Hewitt, was a "3 high mill placed vertically instead of horizontally. Additional horizontal rolls were provided to operate where the vertical rolls came together at the top". Later, the machinery produced heavier rails and structural beams rolled 25 feet in length and 7 inches deep.

Through the years, engineering skill improved the process to meet modern industrial demands. Keeping pace with this technological progress is the development in the fields requiring special steels.

These special steels require special scrap of known analysis, a problem particularly suited to our experience, personnel, equipment, and the strategic location of our offices. Possibly our facilities may help you solve a problem in iron or steel scrap.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Copper Falls, But Not Enough

Producers cut price of copper to 34¢ . . . Consumers say drop is not enough to firm market . . . Producers face problems if they attempt further reduction.

♦ **COPPER USERS** say the latest cut in copper prices will have little effect toward firming up market demand. Major producers have dropped prices 2¢ per lb., to 34¢. But the consensus is that buying won't be stepped up unless a price between 30¢ and 32¢ is established.

Although custom smelter copper still held tentatively at 34¢ per lb., observers were looking for a decline to 33¢.

Phelps Dodge made the first move, dropping from 36¢ effective Feb. 1. Kennecott followed, effective the same date. Anaconda put the 34¢ price into effect Feb. 4.

Producers are in a competitive stranglehold. One points out that it is meeting increased competition from African copper.

Cutting the price presents problems for Kennecott and Anaconda because of their properties in Chile.

When Chile's national budget for 1957 was made up, copper was selling for 40¢ per lb. The government pegged spending on 36¢ copper. It is generally conceded that the Chilean government foresaw the possibility of 34¢ copper and made the necessary adjustments. But a further price cut would make its position uncomfortable.

The Anaconda subsidiary recently signed a new pact with the Chilean union, which will increase its operating costs about 25 pct. Kennecott's labor contract is up for renewal March 31. Even if Kennecott and the union agree, the government has the right to throw out the contracts and reopen negotiations with itself as a participant.

Other prices reductions include: Rhodesian Selection Trust, down 2½¢ per lb., to 31.25¢; brass and bronze ingot, down as much as

3¢ per lb.; some Canadian sources, down to 32.50¢; Lake copper down 2¢ to 34¢. Some fabricators brought their products down to a 34¢ copper base.

A major custom smelter says there is more than enough copper scrap moving. It is currently not in the market for No. 1 copper wire, but has dropped its offered price for No. 2 copper wire and light copper by 1¼¢, to 25.75¢ and 23.50¢ respectively.

BRASS . . . Herman W. Steinkraus, president and chairman of the board, Bridgeport Brass Co., says the "telling effect" brass mill imports are having on the domestic industry is due in great part to, (1) lower wages paid by foreign producers, and (2) availability to them of cheaper copper.

"In European countries, skilled labor is receiving the equivalent of 50¢ an hour, and in Japan 11¢ an hour, against the American companies' average cost per employee of

well over two dollars per hour. As for copper, European and Japanese mills, for example, are paying about 2 to 4 cents less per lb for copper than American primary producers are selling at today."

Hardest hit, according to the Bridgeport Brass president, are copper water tube, plumbers' tube, brass rod and strip.

Mr. Steinkraus reports business is definitely off, causing layoffs and increased unemployment.

ALUMINUM . . . The market is beginning to firm up somewhat. Indications are the first quarter will be better than the fourth quarter 1956, and probably better than most producers had expected.

Aluminum Co. of America says orders are beginning to pick up. The company feels shipments dropped in the fourth quarter because many consumers were living off inventories. It indicates these inventory adjustments are about over, looks for steady increase in business.

Eric West, president, Aluminium Ltd., Inc., U. S. sales subsidiary of the Canadian producer, recently returned from a swing around his territory. He is confident of increased sales, both immediate and future.

There are still some dark clouds. Extrusion business is bad, not picking up to a noticeable degree, says Alcoa. The company has shut down some of its presses. Small extruders are in a scramble to land a share of the reduced demand.

MAGNESIUM . . . Production of primary ingot in 1956 was called "highly satisfactory" by the Magnesium Assn. Despite a strike, the industry boosted output to 68,347 tons from 61,130 tons in 1955. The association says new capacity brought in by Dow at Freeport, Tex., may up 1957 output to about 80,000 tons.

Tin prices for the week: Jan. 30—102.875; Jan. 31—103.125; Feb. 1—102.625; Feb. 4—102.50; Feb. 5—102.50.*

*Estimate.

Primary Prices

(cents per lb.)	Current price	last price	date of change
Aluminum ingot	27.10	25.90	8/10/56
Aluminum pig	25.00	24.00	8/10/56
Copper (E)	34.00	36.00	2/1/57
Copper (CS)	34.00	34.575	1/30/57
Copper (L)	31.00	36.00	2/2/57
Lead, St. L.	15.80	16.30	1/13/56
Lead, N. Y.	16.00	16.50	1/13/56
Magnesium ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	250-275	270-300	12/4/56
Zinc, E. St. L.	13.50	13.00	1/6/56
Zinc, N. Y.	14.00	13.50	1/6/56

ALUMINUM: 99% ingot frt allwd. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic, (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig. Velasco, Tex. **NICKEL:** Port Colbourne, Canada. **ZINC:** prime western. **TIN:** see column at right, other primary prices, pg. 166.

Monthly Average Metal Prices

(Cents per lb except as noted)
Average prices of the major nonferrous metals in January based on quotations appearing in **THE IRON AGE**, were as follows.

Electrolytic copper, del'd	
Conn. Valley	36.00
Copper, Lake	36.00
Straits Tin, New York	101.528
Zinc, E. St. Louis	13.50
Lead, St. Louis	15.80
Aluminum ingot, frt allwd	27.10

Note: Quotations are going prices.



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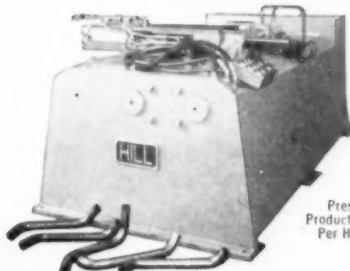
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Nonferrous Prices (Effective Feb. 5, 1957)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate
("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3
1800, 1100, 3003	44.3	42.1	40.9	40.2
5052	51.8	46.8	45.1	42.9
6061-0	48.9	44.6	42.8	42.6

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	45.5-47.3	61.3-65.1
12-14	46.2-47.7	62.2-66.8
24-26	49.4-49.5	73.1-77.8
30-38	58.3-59.0	97.4-101.0

Screw Machine Stock—2011-T-3

Size*	1/8	3/8-5/8	3/4-1	1 1/4-1 1/2
Price	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length*→	72	96	120	144
.019 gage	\$1.352	\$1.803	\$2.254	\$2.704
.024 gage	1.686	2.252	2.815	3.378

MAGNESIUM

(F o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type →	Gage →	.250 3.00	.250 2.00	.188	.081	.032
AZ31B Stand, Grade		67.9	69.0	77.9	103.1	
AZ31B Spec.		93.3	95.7	108.7	171.3	
Tread Plate		70.6	71.7			
Tooling Plate		73.0				

Extruded Shapes

Factor →	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)	37.25 (delivered)
AZ63A, AZ82A, AZ91C (Sand Casting)	40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

"A" Nickel	Monel	Inconel
Sheet, CR	113	97
Strip, CR	111	99
Rod, bar, HR	94	80
Angle, HR	94	80
Plate, HR	107	96
Seamless tube	144	120
Shot, blocks		78

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13		53.36	56.32
Brass, 70/30	48.85	49.39	48.79	51.76
Brass, Low	51.80	52.34	51.74	54.61
Brass, R L	52.84	53.38	52.78	55.65
Brass, Naval	52.92		47.23	56.33
Muntz Metal	50.99		46.80	
Comm. Br.	54.43	54.97	54.37	56.99
Mang. Br.	56.65		50.76	
Phos. Br. 5%	75.22		75.72	

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, \$11.00-\$12.10; alloy, \$14.75; Plate, HR, commercially pure, \$9.25-\$9.75; alloy, \$11.25. Wire, rolled and/or drawn, commercially pure, \$8.50-\$9.00; alloy, \$11.00; Bar, HR or forged, commercially pure, \$7.10-\$7.55; alloy, \$7.10-\$7.30; billets, HR, commercially pure, \$6.85-\$7.10; alloy, \$6.85-\$7.05.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Antimony, American, Laredo, Tex. . . . \$3.50
Beryllium aluminum 5% Be, Dollar per lb contained Be . . . \$74.75
Beryllium copper, per lb cont'd Be . . . \$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading . . . \$71.50
Bismuth, ton lots . . . \$2.25
Cadmium, del'd . . . \$1.70
Calcium, 99.9%, small lots . . . \$4.55
Chromium, 99.8% metallic basis . . . \$1.31
Cobalt, 97-99% (per lb) . . . \$2.35 to \$2.42
Germanium, per gm, f.o.b. Miami Okla., refined . . . \$48.50-\$53.50
Gold, U. S. Treas., per troy oz. . . \$35.00
Iridium, 99.9% dollars per troy oz. . . \$2.25
Lithium, 98% . . . \$11.00 to \$14.00
Magnesium, sticks, 100 to 500 lb . . . \$9.00
Mercury, dollars per 76-lb flask, f.o.b. New York . . . \$255 to \$257
Nickel oxide sinter at Copper Cliff, Ont., contained nickel . . . 71.25
Palladium, dollars per troy oz. . . \$23 to \$24
Platinum, dollars per troy oz. . . \$98 to \$101
Rhodium . . . \$120.00 to \$125.00
Silver ingots (¢ per troy oz.) . . . 91.375
Thorium, per kg . . . \$43.00
Uranium, normal per kg . . . \$40.00
Vanadium . . . \$3.45
Zirconium sponge . . . \$10.00

REMETLED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	32.50
No. 120	31.00
No. 123	29.50
80-10-10 ingot	
No. 305	26.50
No. 315	34.50
88-10-2 ingot	
No. 210	44.75
No. 215	41.50
No. 245	37.00
Yellow ingot	
No. 405	25.75
Manganese bronze	
No. 421	29.00

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	25.00-25.75
0.60 copper max.	24.75-25.50
Piston alloys (No. 122 type)	24.25-25.25
No. 12 alum. (No. 2 grade)	22.50-23.50
108 alloy	22.50-23.50
195 alloy	24.50-25.75
13 alloy (0.60 copper max.)	24.75-25.50
AXS-679	22.50-23.50

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97 1/2%	23.25-24.00
Grade 2—92-95%	22.25-23.00
Grade 3—90-92%	21.25-22.00
Grade 4—85-90%	20.25-21.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	30	29 1/4
Yellow brass	23 1/4	21 3/8
Red brass	26 3/4	26
Comm. bronze	27 3/4	27
Mang. bronze	21 3/4	21
Yellow brass rod ends	23	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27
No. 2 copper wire	25 1/2
Light copper	23 1/4
*Refinery brass	24
*Dry copper content	

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	27
No. 2 copper wire	25 1/2
Light copper	23 1/4
No. 1 composition	25
No. 1 comp. turnings	24 1/2
Hvy. yellow brass solids	17
Brass pipe	17
Radiators	19

Aluminum

Mixed old cast	13 1/2-14
Mixed new clips	15 1/2-16
Mixed turnings, dry	14-14 1/2

Dealer's Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	24 1/2-25
No. 2 copper wire	23-23 1/2
Light copper	21 1/2-22
Auto radiators (unsweated)	16 1/2-17
No. 1 composition	22 1/2-23
No. 1 composition turnings	21-21 1/2
Cocks and faucets	17 1/2-18
Clean heavy yellow brass	15-15 1/2
Brass pipe	18-18 1/2
New soft brass clippings	20-20 1/2
No. 1 brass rod turnings	17-17 1/2

Aluminum

Alum. pistons and struts	5 1/2-6
Aluminum crankcases	10 1/2-11
1100 (2S) aluminum clippings	14-14 1/2
Old sheet and utensils	10 1/2-11
Borings and turnings	7-7 1/2
Industrial castings	10 1/2-11
2024 (24S) clippings	12-12 1/2

Zinc

New zinc clippings	6 1/2-7
Old zinc	4 1/2-5
Zinc routings	2 1/2-2 3/4
Old die cast scrap	2 1/2-2 3/4

Nickel and Monel

Pure nickel clippings	\$1.75-\$1.85
Clean nickel turnings	\$1.50-\$1.60
Nickel anodes	\$1.75-\$1.85
Nickel rod ends	\$1.75-\$1.85
New Monel clippings	80-85
Clean Monel turnings	75
Old sheet Monel	75-80
Nickel silver clippings, mixed	21
Nickel silver turnings, mixed	18

Lead

Soft scrap lead	12 1/2-13
Battery plates (dry)	6 3/4-7
Batteries, acid free	4-4 1/4

Miscellaneous

Block tin	77-78
No. 1 pewter	61-62
Auto babbitt	40-41
Mixed common babbitt	13-13 1/4
Solder joints	18-18 1/2
Siphon tops	42
Small foundry type	14 1/2-15
Monotype	14-14 1/4
Lino. and stereotype	13-13 1/4
Electrotype	12 1/2-12 3/4
Hand picked type shells	9 1/2-10
Lino. and stereo. dross	4 1/2-5
Electro. dross	4-4 1/4

IRON AGE		<i>Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.</i>												
STEEL PRICES		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES STRUCTURALS			STRIP					
<i>(Effective Feb. 5, 1957)</i>		Carbon Re-rolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			\$107.00 B3		5.05 B3	7.40 B3	5.05 B3						
	Buffalo, N. Y.	\$74.00 B3, R3	\$91.50 B3, R3	\$107.00 B3, R3	5.90 B3	5.05 B3	7.40 B3	5.05 B3	4.675 B3, R3	6.85 R7	6.95 B3			
	Claymont, Del.													
	Harrison, N. J.													14.55 C11
	Cenahocken, Pa.		\$96.50 A2	\$114.00 A2					4.725 A2	6.90 A2	6.95 A2			
	New Bedford, Mass.									7.30 R6				
	Johnstown, Pa.	\$74.00 B3	\$91.50 B3	\$107.00 B3		5.05 B3	7.40 B3							
	Bozons, Mass.									7.40 T8				14.90 T8
	New Haven Conn.									7.30 D1				
	Baltimore, Md.									6.85 T8				
	Phoenixville, Pa.					5.85 P2		5.85 P2						
	Sparrows Pt., Md.								4.675 B3		6.95 B3			
	Bridgeport, Wallingford, Conn.	\$79.00 N8	\$96.50 N8	\$107.00 N8						7.30 W1 6.95 N8				
	Pawtucket, R. I. Worcester, Mass.									7.40 A5,N7				14.90 N7
MIDDLE WEST	Alton, Ill.								4.875 L1					
	Ashland, Ky.								4.675 A7					
	Canton-Massillon, Dover, Ohio		\$94.00 R3	\$107.00 R3, T5						6.85 G4		10.10 G4		14.55 G4
	Chicago, Ill. Franklin Park, Ill.	\$74.00 U1, R3	\$91.50 U1, R3,W8	\$107.00 U1, R3,W8	5.90 U1	5.00 U1, W8	7.35 U1, Y1 6.00 W8	5.00 U1	4.675 N4 4.675 A1	6.95 A1,T8			7.75 W8 S9	14.55 A1, S9,T8
	Cleveland, Ohio									6.85 A5,J3			7.75 J3	
	Detroit, Mich.			\$107.00 R5					4.775 G3, M2	6.95 M2,G3, D2,P11	7.05 G3	10.10 G3, D2	7.75 G3	
	Anderson, Ind.									6.85 G4		10.10 G4		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	\$74.00 U1	\$91.50 U1	\$107.00 U1, Y1	5.90 J3	5.00 U1	7.35 U1, J3	5.25 J3	4.675 U1, J3,Y1	6.85 Y1	6.95 U1, J3,Y1	10.20 Y1	7.75 U1, Y1	
	Sterling, Ill.	\$74.00 N4							4.775 N4					
	Indianapolis, Ind.									7.00 C5				
	Newport, Ky.												7.75 A9	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		\$91.50 S1, C10	\$107.00 S1, C10					4.675 S1, R3	6.85 T4	6.95 S1, R3	10.00 S1, R3	7.75 S1	14.55 S1
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$74.00 U1	\$91.50 U1, C11	\$107.00 U1, C11	5.90 U1	5.00 U1, J3	7.35 U1, J3	5.00 U1	4.675 P6	5.750 P6 6.85 J3,B4, S7			7.75 S9	14.55 S9
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					5.00 W3			4.675 W3	6.85 W3,F3	6.95 W3	9.65 W3		
	Youngstown, Ohio	\$74.00 R3	\$91.50 Y1, C10	\$107.00 Y1		5.00 Y1	7.35 Y1		4.675 U1, Y1	6.85 Y1,C5	6.95 U1, Y1	10.20 Y1	7.75 U1, Y1	
WEST	Fontana, Cal.	\$83.50 K1	\$101.00 K1	\$128.00 K1		5.75 K1	8.10 K1	5.90 K1	5.525 K1	8.70 K1				
	Geneva, Utah	\$91.50 C7				5.00 C7	7.35 C7							
	Kansas City, Mo.					5.10 S2	7.45 S2		4.925 S2		7.20 S2			
	Los Angeles, Torrance, Cal.		\$101.00 B2	\$127.00 B2		5.70 C7, B2	8.05 B2		5.425 B2, C7	8.80 C1			8.95 B2	
	Minnequa, Colo.					5.30 C6			5.775 C6					
	Portland, Ore.					5.75 O2								
	San Francisco, Niles, Pittsburg, Cal.		\$101.00 B2			5.65 B2	8.00 B2		5.425 C7,B2					
	Seattle, Wash.		\$105.00 B2			5.75 B2	8.10 B2		5.675 B2					
SOUTH	Atlanta, Ga.								4.875 A8					
	Fairfield, Ala. City, Birmingham, Ala.	\$74.00 T2	\$91.50 T2 <i>new price</i>			5.30 T2,R3 5.30 C16	7.35 T2		4.675 T2,R3 4.975 C10		6.95 T2			
	Houston, Lone Star, Texas	\$80.00 L3	\$96.50 S2	\$112.00 S2		5.10 S2	7.45 S2		4.925 S2		7.20 S2			

IRON AGE

STEEL
PRICES(Effective
Feb. 5, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled 18 ga. & hvyr.	Cold- rolled	Galvanized	Enamel- ing	Long Tone	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot- rolled 19 ga.	Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.
EAST	Bethlehem, Pa.												
	Buffalo, N. Y.	4.675 B3	5.75 B3				6.90 B3	8.525 B3		5.80 W6	† Special coated mfg. terms deduct 50¢ from 1.25-lb. coke base box price, Can-making quality blackplate 55 to 128 lb. deduct \$2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add \$1.00. Differ- ential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Colesville, Pa.												
	Conschocken, Pa.	4.725 A2	5.80 A2				6.95 A2						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									5.80 B3			
	Fairless, Pa.	4.725 U1	5.80 U1				6.95 U1	8.575 U1			\$9.80 U1	\$8.50 U1	
	New Haven Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	4.675 B3	5.75 B3	6.30 B3			6.90 B3	8.575 B3	9.275 B3	5.90 B3	\$9.80 B3	\$8.50 B3	
	Worcester, Mass.									6.10 A5			
MIDDLE WEST	Trenton, N. J.												
	Alton, Ill.									6.00 L1			
	Ashland, Ky.	4.675 A7		6.30 A7	6.325 A7								
	Canton-Massillon, Dover, Ohio			6.30 R3, R1									
	Chicago, Joliet, Ill.	4.675 W8, A1					6.90 U1			5.80 K2	5.80 A5, R3, N4, W8, K2		
	Sterling, Ill.										5.90 N4, K2		
	Cleveland, Ohio	4.675 J3, R1	5.75 J3, R1		6.325 R3		6.90 R3	8.525 R3, J3			5.80 A5		
	Detroit, Mich.	4.775 G3, M2	5.85 G3 5.75 M2				7.00 G2	8.625 G3					
	Newport, Ky.	4.675 A9	5.75 A9										
	Gary, Ind. Harbor, Indiana	4.675 U1, I3, Y1	5.75 U1, I3, Y1	6.30 U1, I3	6.325 U1, I3, Y1	6.70 U1	6.90 U1, Y1, I3	8.525 U1, Y1		5.80 Y1	\$9.70 U1, Y1	\$8.40 J3, U1, Y1	7.15 U1, Y1
	Granite City, Ill.	4.875 G2	5.95 G2	6.50 G2	6.525 G2							\$8.50 G2	7.25 G2
	Kokomo, Ind.			6.40 C9						5.90 C9			
	Mansfield, Ohio		5.75 E2			6.70 E2							
	Middletown, Ohio		5.75 A7	6.30 A7	6.325 A7	6.70 A7							
	Niles, Warren, Ohio Sharon, Pa.	4.675 S1, R3, N3	5.75 R3	6.30 R3	6.325 N3	6.70 N3	6.90 S1, R3	8.525 S1, R3				\$8.40 R3	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.675 U1, J3, P6	5.75 U1, J3, P6	6.30 U1, J3	6.325 U1		6.90 U1, J3, R3	8.525 U1, J3	9.275 U1	5.80 A5, P6, J3	\$9.70 J3, U1	\$8.40 U1, J3	7.15 U1, J3
	Portsmouth, Ohio	4.675 P7	5.75 P7							5.80 P7			
	Weirton, Wheeling, Fallsboro, W. Va.	4.675 W3, W5	5.75 W3, W5, F3	6.30 W3, W5		6.70 W3, W5	6.90 W3	8.525 W3			\$9.70 W5	\$8.40 W5	7.15 W5 7.00 W3
	Youngstown, Ohio	4.675 U1, Y1	5.75 Y1		6.325 Y1		6.90 Y1	8.525 Y1		5.80 Y1			7.15 Y1
WEST	Fontana, Cal.	5.525 K1	7.00 K1				7.75 K1	9.775 K1			\$10.45 K1	\$9.15 K1	
	Geneva, Utah	4.775 C7											
	Kansas City, Mo.									6.05 S2			
	Los Angeles, Torrance, Cal.									6.60 B2			
	Minneapolis, Cal.									6.05 C6			
	San Francisco, Niles, Pittsburg, Cal.	5.375 C7	6.70 C7	7.05 C7						6.45 C7	\$10.45 C7	\$9.15 C7	
	Seattle, Wash.												
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	4.675 T2, R3	5.75 T2,	6.30 T2, R3						5.80 T2, R3	\$9.80 T2	\$8.50 T2	
	Houston, Tex.									6.05 S2			

IRON AGE

STEEL
PRICES(Effective
Feb. 5, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

	BARS						PLATES				WIRE
	Carbon [†] Steel	Reinforc- ing	Cold Finished	Alloy Hot- rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.			6.125 B3	8.325 B3	7.40 B3					
	Buffalo, N. Y.	5.075 B3,R3	5.075 B3,R3	6.90 B5	6.125 B3,R3	8.325 B5,B3	7.40 B3	4.85 B3			7.20 W6
	Claymont, Del.						5.70 C4		6.85 C4	7.55 C4	
	Coatesville, Pa.						5.25 L4		6.85 L4	7.55 L4	
	Conshohocken, Pa.						4.95 A2	5.925 A2	6.85 A2	7.25 A2	
	Harrisburg, Pa.						5.90 P2	6.275 P2			
	Hartford, Conn.		7.35 R3			8.625 R3	7.40 B3				
	Johnstown, Pa.	5.075 B3	5.075 B3		6.125 B3						
	Fairless, Pa.	5.225 U1	5.225 U1		6.275 U1		4.85 B3		6.85 B3	7.25 B3	7.20 B3
	Newark, N. J.			7.30 W10		8.50 W10					
	Camden, N. J.			7.30 P10		8.50 P10					
	Bridgeport, Conn. Putnam, Conn.	5.30 N8	5.30 N8	7.20 N8 7.40 W10	6.20 N8	8.475 N8	7.50 N8				
	Sparrows Pt., Md.		5.075 B3				4.85 B3		6.85 B3	6.85 B3	7.30 B3
	Palmer, Worcester, Needville, Mass. Milton, Pa.	5.225 M7	5.225 M7	7.40 B5,C14		8.325 A5 8.625 B5					7.50 A5,W6 9.025 T8
	Spring City, Pa.			7.30 K4		8.50 K4					
MIDDLE WEST	Alton, Ill.	5.275 L1									7.40 L1
	Ashland, Newport, Ky.						4.85 A7,A9		6.85 A9		
	Canton, Massillon, Ohio			6.85 R3,R2	6.125 R3,T5	8.325 R3,R2, T5					
	Chicago, Joliet, Ill.	5.075 U1,R3, W8,N4 5.575 P13	5.075 U1,R3, N4 5.575 P13	6.85 A5,B5, W10,L2 W8,N9	6.125 U1,R3, W8	8.325 A5,B5, W8,L2,N9, W10	5.875 W8 4.85 U1,I3, W8,A1	5.925 U1	6.85 U1,W8	7.25 U1	7.20 A5,K2 R3,N4,W7
	Cleveland, Ohio	5.075 R3	5.075 R3	6.85 A5,C13		8.325 A5,C13	7.425 R3	4.95 J3,R3	5.925 J3		7.25 J3,R3 7.20 A5, C13
	Detroit, Mich.	5.175 G3	5.425 G3	7.05 B5,P8 7.10 P3 6.85 R5	6.225 G3	8.525 B5,P3, P8 8.325 R5	7.525 G3	4.95 G3		6.90 G3	
	Duluth, Minn.										7.20 A5
	Gary, Ind. Harbor, Crawfordsville	5.075 U1,I3, Y1	5.075 U1,I3, Y1	6.85 R3,M5	6.125 U1,I3, Y1	8.325 R3,M4	7.425 U1,I3, Y1	4.85 U1,I3, Y1	5.925 I3	6.85 U1,Y1	7.25 U1,Y1 7.30 M4
	Granite City, Ill.						5.85 G2				
	Kokomo, Ind.										7.30 C9
	Sterling, Ill.	5.525 N4	5.175 N4								7.30 K2
	Niles, Warren, Ohio Sharon, Pa.			6.85 C10	6.125 C10,S1	8.325 C10	7.425 S1	4.85 S1,R3		6.85 S1	7.25 S1,R3
	Pittsburgh, Pa. Midland, Pa.	5.075 U1, C11,J3	5.075 U1,J3	6.85 A5,C8, J3,R3,S9, B4,W10,C11	6.125 U1, C11,J3	8.325 A5,R3, S9,C8,W10, C11	7.425 U1,J3	4.85 U1,J3	5.925 U1	6.85 U1,J3	7.25 U1,J3 7.20 A5,J3, P6
	Portsmouth, Ohio										7.20 P7
	Weirton, Wheeling, Follansbee, W. Va.						4.85 W5				
	Youngstown, Ohio	5.075 U1, Y1,R3	5.075 U1, Y1,R3	6.85 U1,Y1, F2	6.125 U1,Y1	8.325 Y1,F2	7.425 U1,Y1	4.85 U1,Y1, R3		6.85 Y1	7.25 Y1 7.20 Y1
WEST	Emeryville, Cal.	5.825 J5	5.825 J5								
	Fontana, Cal.	5.775 K1	5.775 K1		7.175 K1		8.125 K1	5.60 K1		7.60 K1	8.00 K1
	Genoa, Utah	5.175 C7						4.85 C7			7.25 C7
	Kansas City, Mo.	5.325 S2	5.325 S2		6.375 S2		7.675 S2				7.45 S2
	Los Angeles, Torrance, Cal.	5.775 C7,B2	5.775 C7,B2	8.30 R3,P14	7.175 B2	10.10 P14	8.125 B2				8.15 B2
	Minneapolis, Colo.	5.525 C6	5.525 C6					5.70 C6			7.45 C6
	Portland, Ore.	5.825 O2	5.825 O2								
	San Francisco, Niles, Pittsburg, Cal.	5.775 C7 5.825 B2 6.025 P9	5.775 C7 5.825 B2 6.025 P9				8.175 B2				8.15 C7,C6
	Seattle Wash.	5.825 B2 N6	5.825 B2				8.175 B2	5.75 B2		7.75 B2	8.15 B2
	Atlanta, Ga.	5.575 A8									7.40 A8
SOUTH	Fairfield, Ala. City, Birmingham, Ala.	5.075 T2,R3 5.375 C16	5.075 T2,R3 5.375 C16				7.425 T2	4.85 T2,R3		7.25 T2	7.20 T2,R3
	Houston, Ft. Worth, Lone Star, Tex.	5.325 S2	5.325 S2		6.375 S2		7.675 S2	4.95 S2 5.20 L3		6.95 S2	7.35 S2 7.45 S2

[†] Merchant Quality—Specialty Quality .35¢ higher.

February 7, 1957

Steel Prices (Effective Feb. 5, 1957)

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Clad Metals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metals Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shaling Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shaping Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.
D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Dutton Div., Philadelphia
E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.
F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown

F3 Follansbee Steel Corp., Follansbee, W. Va.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G6 Greer Steel Co., Dover, O.
H1 Hanna Furnace Corp., Detroit
I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland
J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.
K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.
L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.
M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.
O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland
P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit

P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebbing Sons Co., John A. Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.
S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seacoma Steel Service, Buffalo
T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston
U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham
W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheeland Tube Co., Wheeland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wycoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.
Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (per) f.o.b. mills. Base price about \$200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS									
	1/2 In.		3/4 In.		1 In.		1 1/4 In.		1 1/2 In.		2 In.		2 1/2 In.		3 In.		3 1/2 In.							
	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.
Sparrows Pt. B3	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75										
Youngstown R3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Fontana K1	+0.50	+19.75	2.50	+15.75	5.00	+12.50	7.50	+10.50	8.00	+9.50	8.50	+9.00	10.00	+8.25										
Pittsburgh J3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25		
Alton, Ill. L1	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75										
Sharon M3	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Fairless N2	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75										
Pittsburgh N1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25		
Wheeling W5	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Wheeland W4	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75										
Youngstown Y1	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25		
Indiana Harbor Y1	11.50	+5.75	14.50	1.25	17.00	3.75	19.50	4.50	20.00	5.50	20.50	6.00	22.00	5.75										
Lorain N2	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25		
EXTRA STRONG																								
PLAIN ENDS																								
Sparrows Pt. B3	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75										
Youngstown R3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Fairless N2	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75										
Fontana K1	4.00		8.00		10.00		10.50		11.00		11.50		12.00											
Pittsburgh J3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25		
Alton, Ill. L1	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75										
Sharon M3	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Pittsburgh N1	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25		
Wheeling W5	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Wheeland W4	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75										
Youngstown Y1	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25		
Indiana Harbor Y1	16.00	3.25	20.00	6.25	22.00	9.75	22.50	8.50	23.00	9.50	23.50	10.00	22.00	8.75										
Lorain N2	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25		

Threads only, butt weld and seamless 2 1/2 in. higher discount. Plain ends, butt weld and seamless, 3-in. and under, 5 1/4 in. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2-in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2 1/2 and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts.
East St. Louis zinc price now 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	\$1.68	T-1
18	4	1	—	5	2.385	T-4
18	4	2	—	—	1.185	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	2	5	—	1.185	M-2

High-carbon chromium83 D-3, D-5
Oil hardened manganese45 O-2
Special carbon41 W-1
Extra carbon345 W-1
Regular carbon29 W-1
Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (A3, J2, L4)			Sheet (12)
	10 pct	15 pct	20 pct	
302				35.50
304	34.60	38.00	41.50	37.75
316	39.70	43.20	46.65	55.50
321	36.35	39.80	43.50	44.75
347	39.50	43.95	48.45	54.25
405	29.20	33.15	37.05	
410, 430	28.70	32.65	36.55	

CR Strip (S9) Copper, 10 pct, 2 sides, 40.85; 1 side, 33.50.

WARE-HOUSES

		Seeds			Strip	Plates	Shapes	Bars			Alloy Bars			
Cities	Cty Delivery; Charge	Hot-Rolled (18 ga. & hr.)	Cold-Rolled (15 gage)	Galvanized (10 gage) †	Hot-Rolled	Standard Structural	Hot-Rolled (merchant)	Hot-Rolled (special quality)	Cold- Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed	
Atlanta		8.17	9.37	9.83	8.21	8.55	8.59	8.30	10.23					
Baltimore	\$.10	7.79	8.99	9.12	8.27	8.12	8.57	8.34	9.09	14.99	14.44	18.39	18.09	
Birmingham	.15	7.68	8.88	8.85	7.78	8.91	8.05	7.91	8.44	10.04				
Boston	.10	7.80	9.00		7.82		8.20		10.12					
Buffalo	.15	8.94	9.83	11.16	8.89	9.28	9.20	9.02	9.57	10.71	15.05	14.59	18.51	
Chicago	.15		9.98		8.99				10.81					
Cincinnati	.15	8.00	9.15	11.86	8.20	8.45	8.65	8.15	8.85	15.00	14.45	18.40	18.10	
Cleveland	.15	7.80	9.00	9.85	7.82	8.31	8.20	7.92	8.44	8.50	14.50	14.10	18.05	
Denver					7.97		8.35	8.06	8.59					
Detroit	.15	8.09	9.20	9.90	8.29	8.67	8.89	8.37	8.87	8.99	14.93	14.38	18.33	
Houston		7.93	9.13	9.75	8.07	8.54	8.72	8.14	8.67	8.75	14.73	14.18	18.13	
Kansas City	.20	9.55	11.09	12.41	9.70	9.80	9.60	9.75	10.54					
Los Angeles	.10	8.18	9.40	11.70	8.32	8.66	8.89	8.36	8.86	8.83	14.36		18.01	
Memphis	.15	8.80	9.75		8.85	8.80	9.10	9.00	10.65	15.50		19.30	19.05	
Milwaukee	.15	8.52	9.72	10.07	8.60	8.83	8.87	8.73	9.42	15.32	14.77	18.72	18.42	
New York	.10	9.00	10.75	11.75	9.20	9.45	9.05	8.90	9.60	11.80	15.85	15.35	19.70	
Philadelphia	.10	9.20	10.90		9.25				9.85				19.45	
Pittsburgh	.15	8.02	9.22		8.12	8.35	8.39	8.25						
Portland		8.08	9.28	9.97	8.10	9.75	9.25	8.18	8.71	8.72	14.77	14.22	18.17	
San Francisco	.10	8.55	9.76	10.33	9.00	9.11	9.01	8.96	9.48	10.75	15.02	14.49	18.42	
Seattle		8.00			8.40	8.35	8.70	8.45	10.70					
Spokane	.15	8.25	9.17	10.22	8.68	8.78	8.80	8.65	9.18	9.41	14.80	14.41	18.20	
St. Louis	.15		10.39		8.92				9.12				18.06	
St. Paul	.15	7.93	9.14	10.20	7.88	8.31	8.35	8.06**	8.59	8.75	15.20	14.10	18.05	
Tampa		8.90	9.65	11.40	9.05	8.70	8.90	8.95	13.55	16.70	16.10	20.40	20.25	
Wash. D.C.		9.05	10.40	10.90	9.05	9.30	9.15	8.90	9.45	12.40	15.85	15.35	19.70	
Wichita	.10	9.35	10.45	11.55	9.50	9.30	9.15	9.30	9.85	13.15	16.55	15.55	19.50	
Yonkers	.15	9.55	10.70	11.65		9.35			13.30			15.65		
Albany	.15	9.50	10.60	11.90	9.70	9.20	9.30	9.45	10.00	13.30		16.55	20.10	
Albany	.15	9.70	10.85		9.45	9.50								
Albany	.15	8.54	9.74	10.21	8.34	8.67	8.82	8.40	8.96	9.08	14.83	14.43	18.23	
Albany	.15				8.43			8.43		9.11	14.98	14.46	18.38	
Albany	.15	8.29	9.64	10.31	8.39	8.71	8.75	8.52	9.21		14.62	14.62	18.27	

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

**F.O.B. Plant, warehouse price. †16 gage. ††13 1/2¢ zinc. ‡Deduct for country del'ry.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi- Processed	Fully Processed
Field	9.00	9.20	10.85
Armature	10.35	10.35	11.525
Elect.	11.00	11.025	12.575
Motor	12.05	12.075	13.55
Dynamo	13.05	13.05	14.55
Trans. 72	14.05	14.05	15.55
Trans. 65	14.60		
Trans. 58	15.10	Trans. 80	18.50
Trans. 52	16.15	Trans. 73	19.00

Producing points: Beech Bottom (W3); Brackenridge (A3); Granite City (G2); Indiana Harbor (I3) Mansfield (E2); Newport, Ky. (N3); Niles, O. (N3); Vandergrift (U1); Warren, O. (R3) (20¢ higher, HR); Zanesville, Butler (A7).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight charges for seller's account.

	Gross Ton
Openhearth lump	\$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.15

Metropolitan Price, dollars per 100 lb.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Cuted Nails		Woven Wire Fence		1/2" Fence Posts		Galv. Barbed and Twisted Barbed Wire		Merch. Wire Ann'd		Merch. Wire Galv.	
	Col	Col	Col	Col	Col	Col	e lb.	e lb.	e lb.	e lb.	e lb.	e lb.
Alabama City R3	167	181			195	187	8.10	8.50				
Aliquippa, Pa. J3**	164	179			192	181	7.95	8.475				
Atlanta A8**	166	182			192	190	8.05	8.65				
Bartonsville K2**	166	182			192	190	8.05	8.65				
Buffalo W6							8.10	8.50				
Chicago, Ill. N4**	164	180	167	190	188	7.95	8.55					
Cleveland A6	173						8.10					
Crawfordsville M4**	166	182			192	190	8.05	8.65				
Denora, Pa. A5	164	176			190	184	7.95	8.35				
Duluth A5	164	176			190	184	7.95	8.35				
Fairfield, Ala. T2	164	176			190	184	7.95	8.35				
Galveston D4	169	181			195	189	8.20	8.60				
Houston S2	164	180	167		195	189	8.20	8.60				
Johnstown, Pa. B3**	164	176			190	184	7.95	8.35				
Joliet, Ill. A5	166	178			192	186	8.05	8.45				
Kokomo, Ind. C9*	166	178			192	186	8.05	8.45				
Los Angeles B2**	169	181			195	189	8.20	8.60				
Kansas City S2*	169	181			195	189	8.20	8.60				
Minneapolis C6†	169	181	172	195	189	8.20	8.60					
Monessen P6	167	185					191	8.10				
Pittsburg, Cal. C7	186	199					204	8.90				
Portsmouth P7							7.95					
Rankin, Pa. A5	164	176			190	184	7.95	8.35				
So. Chicago R3	167	181			195	187	8.10	8.50				
S. San Francisco C6					214		8.90	9.30				
Sparks Pt. B3**	166				192	190	8.05	8.65				
Surshera, O. Y1*							7.95	8.45				
Worcester A5	170						8.25	8.65				
Williamsport, Pa. S5			175									

* Zinc less than .10%. † Plus zinc extras.
** 13.5 zinc. ‡ wholesalers only.
*** .10% zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT					
	0.26- 0.40	0.41- 0.60	0.61- 0.80	0.81- 1.05	1.06- 1.35	
Baltimore, Md. T8	8.25	10.10	12.30	15.30	18.25	
Bristol, Conn. W12			12.30	15.30	18.25	
Boston T8	8.50	10.10	12.30	15.30	18.25	
Buffalo, N. Y. R7	7.95	9.80	12.60	15.00	17.95	
Carnegie, Pa. S9	7.95	9.80	12.60	15.00	17.95	
Cleveland A5	7.95	9.80	12.60	15.00	17.95	
Detroit D1	8.05	9.90	12.10	15.10		
Detroit D2	8.05	9.90	12.10			
Dover, O. G4	7.95	9.80	12.60	15.00	17.95	
Franklin Park, Ill. T8	8.05	9.80	12.60	15.00	17.95	
Harrison, N. J. C1†	8.10	9.95	12.40	15.00	17.95	
Indianapolis C3	8.10	9.95	12.40	15.00	17.95	
New Castle, Pa. B4	7.95	9.80	12.60	15.00		
New Haven, Conn. D1	8.40	10.10	12.30	15.30		
Pawtucket, R. I. N7	8.50	10.10	12.30	15.30	18.25	
Pittsburgh S7	7.95	9.80	12.60	15.00	17.95	
Riverdale, Ill. A1	8.05	9.80	12.60	15.00	17.95	
Sharon, Pa. S1	7.95	9.80	12.60	15.00	17.95	
Trenton R4		10.10	12.30	15.30	18.25	
Wallingford W1	8.40	10.10	12.30	15.30	18.15	
Warren, Ohio T4	7.95	9.80	12.60	15.00	17.95	
Weirton, W. Va. W3	7.95	9.80	12.60	15.00	17.95	
Worcester, Mass. A5	8.50	10.10	12.30	15.30	18.25	
Youngstown C5	7.95	9.80	12.60	15.00	17.95	

† On Application.

BOILER TUBES

\$ per 100 ft. carload less, cut 10 to 24 ft. F.o.b. Mill	Size		Seamless		Elec. Weld	
	OD- In.	B.W. Ga.	H.R.	C.D.	H.R.	C.D.
Babcock & Wilcox	2	13	34.88	40.85	33.21	
	2 1/2	12	46.98	55.01	44.73	
	3	12	54.24	63.53	51.64	
	3 1/2	11	63.32	74.16	60.30	
	4	10	84.09	98.47	80.07	
National Tube	2	13	34.88	40.85	33.21	
	2 1/2	12	46.98	55.01	44.73	
	3	12	54.24	63.53	51.64	
	3 1/2	11	63.32	74.16	60.30	
	4	10	84.09	98.47	80.07	
Pittsburgh Steel	2	13	34.88	40.85		
	2 1/2	12	46.98	55.01		
	3	12	54.24	63.53		
	3 1/2	11	63.32	74.16		
	4	10	84.09	98.47		

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb.	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Balls Unthreaded
Bessemer U1	5.075	6.00	6.35				
Se. Chicago R3				8.775			
Ensley T2	5.075	6.00					
Fairfield T2	5.075	6.00		8.775	6.025		
Gary U1	5.075	6.00			6.025		
Ind. Harbor J3	5.075		6.35	8.775	6.025		
Ind. Harbor Y1				8.775			
Johnstown B3		6.00					
Joliet U1	5.075	6.35					
Kansas City S2				8.775			
Lackawanna B3	5.075	6.00	6.35		6.025		
Lebanon B3						13.10	
Minneapolis C6	5.075	6.50	6.35	8.775	6.025	13.10	
Pittsburgh P5				8.775	12.85		
Pittsburgh J3				8.775		13.10	
Seattle B2				9.275	6.175	13.10	
Steelton B3	5.075	6.35			6.025	13.10	
Struthers Y1				8.775			
Terrence C7							
Williamsport S5	6.15						
Youngstown R3				8.775			

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. \$15.00 to \$15.75
Foundry, beehive (f.o.b. oven)
..... \$17.50 to \$19.00

Foundry oven coke	
Buffalo, de'd	\$30.75
Detroit, f.o.b.	29.50
New England, de'd	29.75
Kearny, N. J., f.o.b.	29.75
Philadelphia, f.o.b.	29.50
Swedesland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	29.50
Erie, Pa., f.o.b.	29.50
Cleveland, de'd	31.55
Cincinnati, de'd	28.59
St. Paul, f.o.b.	29.75
St. Louis, f.o.b.	30.50
Birmingham, f.o.b.	27.60
Milwaukee, f.o.b.	29.50
Lone Star, f.o.b.	25.50
Neville, Ia., Pa.	29.25

ELECTRODES

Cents per lb f.o.b. plant, threaded, with
nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (in.)	Length (in.)	Price	Diam. (in.)	Length (in.)	Price
24	84	24.75	40	100, 110	10.70
20	72	24.00	35	110	10.70
16 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
10	60	26.50	17	72	11.40
10	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.00
4	40	33.25	8	60	13.30
3	40	35.25			
2½	30	37.25			
2	24	57.75			

*Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes	
(Cents per lb, frt. allowed in quantity)	
Copper	
Cast elliptical, 18 in. or longer, 5000 lb lots	53.42
Electrodeposited	43.28
Brass, 80-20, ball anodes, 2000 lb or more	54.00
Zinc, ball anodes, 2000 lb lots	24.25
(for elliptical add 2c per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	\$1.0225
(rolled depolarized add 2c per lb)	
Cadmium	\$1.70
Tin, ball anodes and elliptical \$1.97 per in.	
Chemicals	
(Cents per lb, f.o.b. shipping point)	
Copper cyanide, 100 lb drum	77.50
Copper sulphate, 100 lb bags, per cwt.	26.65
Nickel salts, single, 100 lb bags	40.50
Nickel chloride, freight allowed, 300 lb	45.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.05
(Philadelphia price 23.30)	
Zinc cyanide, 100 to 300 lb	55.55
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 1 to 20 100-499 lb drums	31.75

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)
Pct Discounts

Machine and Carriage Bolts	Full Con- tainer Price	30 Con- tainers	20,000 Lb.	40,000 Lb.
½" and smaller x 6" and shorter	55	58½	60½	61½
¾" thru 1" x longer than 6"	46½	50	52½	54
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	55	58½	60½	61½
Lag, all diam. x 6" & shorter	55	58	60	61
Lag, all diam. longer than 6 in.	47	50	52	53
Flow bolts, ½" and smaller x 6" and shorter	54	57½	59	60

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy. Full Case or
Keg Price

¾ in. or smaller	63
¾ in. to 1 in. inclusive	59½
1¼ in. to 1½ in. inclusive	64
1½ in. and larger	58

C.P. Hex regular & hvy.

¾ in. and smaller	63
¾ in. to 1½ in. inclusive	59½
1½ in. and larger	58

Hot Galv. Nuts (All Types)

¾" and smaller	50
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Semi-finished Hex Nuts

¾ in. and smaller	63
¾ in. to 1½ in. inclusive	59½
1½ in. and larger	58

(Add 25 pct for broken case or keg
quantities)

Finished

1" and smaller	65
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Rivets

Base per 100 lb	
½ in. and larger	\$10.85
Pct Off List	
7/16 in. and smaller	26½

Cap Screws

Discount (Packages)
Bright Treated H. C. Heat

New std. hex head, pack- aged	
¾" diam. and smaller x 6" and shorter	47 34
¾", ¾" and 1" diam. x 6" and shorter	31 13
¾" diam. and smaller x longer than 6"	18½ + 1
¾", ¾" and 1" diam. & longer than 6"	5½ + 19½
C-1018 Steel Full-Finished Carbons Bulk	
¾" through ¾" dia. x 6" and shorter	47 63
¾" through 1" dia. x 6" and shorter	31 51½
Minimum quantity—¾" through ¾" diam., 15,000 pieces; 1/16" through ¾" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.	

Machine Screws & Stove Bolts

Plain Finish	Discount	Mach.	Stove
Cartons	Quantity	Screws	Bolts
To ¾"		19	32
25,000-200,000	9	54	
incl.			
5/16 to ½"	9	54	
diam. incl.			
All diam. over 3" long	—	54	

Machine Screw & Stove Bolt Nuts

In cartons	Discount	Hex	Square
Quantity	Quantity		
15,000-100,000	7	9	
¾" diam. & smaller			

CAST IRON WATER PIPE INDEX

Birmingham	119.0
New York	131.7
Chicago	134.1
San Francisco-L. A.	140.2
Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Ex- planation: p. 57, Sept. 1, 1955 issue. Source: U. S. Pipe and Foundry Co.	

REFRACTORIES**Fire Clay Brick**

Carloads per 1000	
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$128.00
No. 1 Ohio	128.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$2.00)	20.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	\$140.00
Childs, Hays, Pa.	145.00
Chicago District	150.00
Western Utah	144.00-165.00
California	170.00
Super Duty	
Hays, Pa., Athens, Tex., Wind- ham, Warren, O., Morrisville	150.00-157.00
Silica cement, net ton, bulk, Latrobe	26.50
Silica cement, net ton, bulk, Chi- cago	24.00
Silica cement, net ton, bulk, Ens- ley, Ala.	25.50
Silica cement, net ton, bulk, Mt. Union	23.00
Silica cement, net ton, bulk, Utah and Calif.	35.00

Chrome Brick

Standard chemically bonded, Balt.	\$98.00
Standards chemically bonded, Curt- ner, Calif.	108.00
Burned, Balt.	92.00

Magnesite Brick

Standard, Baltimore	\$121.00
Chemically bonded, Baltimore	109.00

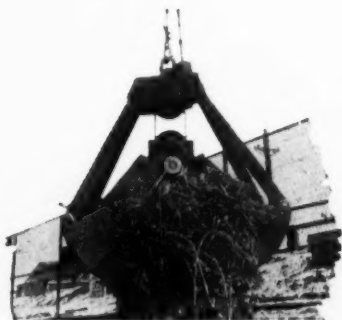
Grain Magnesite St. ¾ to ½-in. grains	
Domestic, f.o.b. Baltimore in bulk	\$69.40
Domestic, f.o.b. Chewelah, Wash., Luning, Nev.	
in bulk	43.00
in sacks	49.00

Dead Burned Dolomite

Per net ton	
F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	\$16.00
Midwest	16.35
Missouri Valley	15.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh	
Swedish sponge iron f.o.b.	
Riverton, N. J., ocean bags	8.50¢
Canadian sponge iron, Del'd in East, carloads	9.5¢
Domestic sponge iron, 98+%	
Fe. carload lots	8.5¢
Electrolytic iron, annealed, imported 99.5+%	27.5¢
domestic 99.5+%	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+%	57.0¢
Electrolytic iron melting stock, 99.84% pure	22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 99.8+%	Fe. 86.0¢ to \$1.55
Aluminum, freight allowed	38.00¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	49.75¢
Copper, reduced	49.75¢
Cadmium, 100-199 lb, 95¢ plus metal value	
Chromium, electrolytic 99.85% min. Fe .03 max. Del'd	\$5.00
Lead	8.90¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	\$3.60 to \$3.95
Nickel, unannealed	\$1.00
Nickel, annealed	\$1.06
Nickel, spherical, unannealed #80	\$1.13
Silicon	43.50¢
Solder powder, .70¢ to 9.0¢ plus met. value	
Stainless steel, 302	99.0¢
Stainless steel, 316	\$1.32
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.20
Zinc, 10 ton lots	18.75¢ to 32.50¢



Bucket handles turnings —and other scrap, too!

Here is the husky Class K Hayward you see in so many mills and plants everywhere. You can't beat this powerful bucket for handling turnings, other scrap or almost anything else. Available also with special digging teeth for heavy rock work, cutting clay, handling rubbish. The Hayward Company, 50 Church St., New York 7, N. Y.

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EDGE STRIP STEEL** In stock at
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New York City

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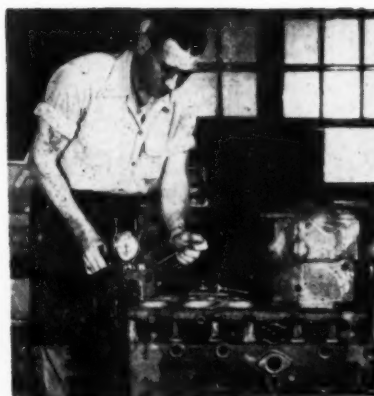
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Solve quality control problems with the King Portable Brinell Hardness Tester. Take faster, more accurate hardness readings on heavy, odd-shaped metal parts without elaborate fixturing or cutting samples. The King Portable uses a 3000 kg. load on a 10 mm. ball with automatic relief. Intermediate loads as desired. Weighs less than 30 lb. and takes guaranteed accurate tests anywhere. King Testers are the standard of dependability in portable hardness testing equipment around the world. Write for details and specifications.

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CRUCIBLE STEEL CASTING CO.
LANSDOWNE 1, PENNA.

Ferroalloy Prices

(Effective Feb. 5, 1957)

Ferrochromes

Contract prices, cents per lb contained			
Cr, lump bulk, carloads, del'd.	67-71% Cr, 20-100% max. Si		
0.02% C	41.00	0.20% C	38.50
0.03% C	41.00	0.50% C	38.25
0.06% C	39.00	1.00% C	37.50
0.10% C	39.00	1.50% C	37.35
0.15% C	38.75	2.00% C	37.25
1.00-4.50% C, 67-70% Cr, 1-2% Si			27.75
1.60-5.00% C, 67-64% Cr, 2.00-4.50% Si			27.75
0.025% C (Simplex)			34.75
0.10% C, 50-52% Cr, 2% max Si			35.75
8.50% max C, 50-55% Cr, 3-6% Si			24.00
8.50% C, 50-55% Cr, 3% max Si			24.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min, Cr, 1% max. Fe.	
0.10% max C	\$1.31
0.50% max C	1.31
9 to 11% C, 33-31% Cr, 0.75% Fe.	1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (1/4" thick) delivered packed, 99.80% min, Cr (Metallic Base) Fe 0.20 max.	
Carloads	\$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.)	
Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.	
Carloads	44.35
Ton lots	48.95
Less ton lots	51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.	
80-33% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.	
16-20% Ca, 14-18% Mn, 53-59% Si	
Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

3M2

Contract prices, cents per pound of alloy, 1-delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 10% P, 1/4 in. x 12 mesh.	
Ton lots	20.15
Less ton lots	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots	17.30
Ton lots	18.70
Less ton lots	19.95

Graphidex No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.	
Cents per-lb	
Producing Point	
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.75
Johnstown, Pa.	12.75
Sheridan, Pa.	12.75
Philo, Ohio	12.75
B. Duquesne	12.75
Add or subtract 0.1¢ for each 1 pct Mn above or below base content.	
Briquets, delivered, 66 pct Mn:	
Carloads, bulk	14.80
Ton lots packed	17.20

Spiegelstein

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.	
Manganese Silicon	
16 to 19%	3% max. \$100.50
19 to 21%	3% max. 102.50
21 to 23%	3% max. 105.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.	
Carloads	\$1.00
Ton lots	35.00
250 to 1999 lb	37.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn.	
	25.50

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.	
Carloads Ton Less	
0.07% max. C, 0.08% P, 30% Mn	37.15 39.95 41.15
0.07% max. C	35.10 37.90 39.10
0.10% max. C	34.35 37.15 38.35
0.15% max. C	33.60 36.40 37.60
0.20% max. C	32.10 34.90 36.10
0.50% max. C	31.60 34.40 35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	28.60 31.40 32.60

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.	
Carloads bulk	13.80
Ton lots	15.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	15.10
Ton lots, packed	17.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$100.00 gross ton, freight allowed to normal trade area, Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00.	
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Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.	
Ton lots Carloads	
98.50% Si, 2% Fe	23.95 22.65
98% Si, 0.76% Fe	24.45 23.15

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.	
Carloads, bulk	7.70
Ton lots, packed	10.50

Electric Ferrosilicon

Contract prices, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.	
60% Si	13.90
65% Si	15.65
75% Si	16.80
86% Si	18.50
90% Si	19.90

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.	
Cast Turnings Distilled	
Ton lots	\$2.05 \$2.95 \$3.75
Less ton lots	2.40 3.30 4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.	
Openhearth	3.20
Crucible	3.30
High speed steel (Primos)	3.40

Alstifer, 20% Al, 40% Si, 40% Fe. Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.	
Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo.	
	\$1.28

Ferrochromium, 50-50%, 2 in. x D contract basis, delivered per pound contained Cb.	
Ton lots	\$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Sb plus Ta.	
	\$4.95

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.	
	\$1.68

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton	
10 tons to less carload	\$90.00 \$110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti.	
	\$1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti.	
Less ton lots	\$1.50 \$1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton	
	\$215.00

Ferrotungsten, 1/4 x down, packed, per pounds contained W, ton lots delivered	
	\$3.15

Molybde oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa.	
bags, f.o.b. Washington, Pa., Langeloth, Pa.	\$1.41 \$1.38

Simnall, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.	
Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V ₂ O ₅ contract basis, per pound contained V ₂ O ₅	
	\$1.38

Zirconium contract basis, per lb of alloy	
35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15% del'd lump, bulk carloads	9.25¢

Boron Agents

Boroxil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	
2000 lb carload	\$5.50

Bortam, f.o.b. Niagara Falls, Ton lots, per pound	
Less ton lots, per pound	45¢ 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.	
Ton lots per pound	14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.	
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up	85
10 to 14% B	1.20
14 to 19% B	1.20
19% min. B	1.50

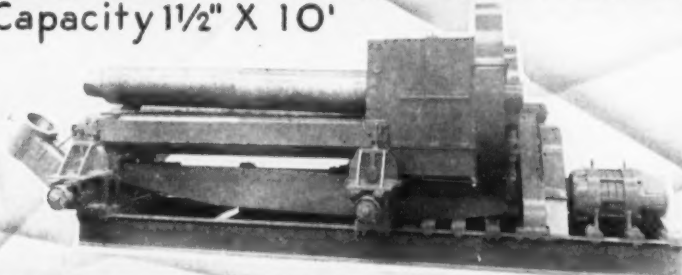
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over	
No. 1	\$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.	
Ton lots	\$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots	
	\$2.15

INITIAL PINCH TYPE PLATE BENDING ROLL

Capacity 1½" X 10'

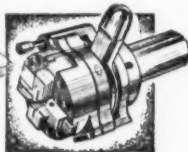


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famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.



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PLASTIC SLITTING MACHINE SHIMS

COST JUST A FRACTION OF METAL SPACERS

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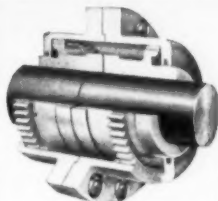
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ALL SIZES AND TYPES
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POOLE FOUNDRY & MACHINE CO.
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STRIP, COILED
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ACCURATELY ROLLED FOR
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SPECIAL OFFERING 50-TON CAPACITY GONDOLA CARS

Length—46'0" Drop Ends
Steel Underframes Steel Ends
Steel Sides Wood Floor

AB Air Brakes

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or STEEL"**

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Different Viewpoints . . . Pittsburgh used machinery dealers report a pickup in business after the December lag but they say there's a general tendency on the part of the buyers to delay in closing deals.

The picture varies according to the lines of equipment considered. Suppliers of rolling mills report good activity. And almost any type of late model machine will find a home in a hurry. However, the market for machine tools and fabricating equipment is sluggish. Tool inquiries are holding up but buyers are not pushing to place orders.

Geared to Steel . . . The area's machinery business is tied to steel mill activity. There have been reports of a slowdown in steelmaking operations. However, this has not shown up in either the buying or selling of dealers specializing in rolling mills. Recent sales include sheet, bar and combination mills. One dealer is in the process of shipping a bar and flat mill to South America.

There has been some easing in the supply of light mill equipment. Levelers, straighteners and other auxiliary items are reported more plentiful. On the other hand, one steel producer recently withdrew an offering of rolling mills from the market.

Tool Interest Lags . . . Machine tool inquiries have picked up since December, according to one dealer, but punches, shears and other fabricating machines are attracting little interest. In general, tool sales are off. For one thing, there is the usual scarcity of the late model machines everyone wants. Also, many inquiries seem to lack any real buying interest. And finally buyers and sellers are acutely price conscious.

Increased prices of new machines have meant that dealers can get a little more when they sell. But it also means they must pay more when they buy. Compa-

nies that put in new machinery feel the value of replaced units should rise in line with prices they must pay.

Cranes Are Rising . . . Crane prices have also moved up on the basis of new equipment increases. Crane buyers generally figure on paying about half the price of a new model when they go into the used crane market. The new price level has helped dealers in their selling but again, there's the problem of buying at a reasonable figure.

It's complicated by the time and cost of dismantling cranes. It costs about \$1000 to take down a 10-ton, 60 ft. crane. One New England shipbuilder recently offered ten cranes, most of them over 100 ft. span. After viewing bids, the yard decided to scrap the cranes. In another case, a steel mill with four cranes to sell wanted them removed in four days.

Some Fussy, Some Not . . . This kind of reaction has resulted in a scarcity of cranes and slowed sales for dealers. Buyers are after a particular current, a particular span and a particular capacity. They prefer late model cranes but will waive this requirement if they can get the desired specifications. Some are more flexible in this than others. One buyer wanted a 67 ft crane but took a 62 ft model and built it up to fit his building.

View at St. Louis . . . Dealers in that area describe the market as a seller's. Demand is heaviest for shears, punch presses and press brakes. This equipment has always been strongly sought in the St. Louis area, however.

News From the MDNA . . . Machinery Dealers National Assn. reports its membership roster now exceeds 200. The group's board of directors will meet in Philadelphia in mid-March.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDER—PIPE

6" U. S. Pipe Bender, Titan Model

BENDING ROLLS

5' x 16" Niagara Initial Type
10' x 12" Bertsch Initial Type
10' x 12" King Pyramid Type
16' x 12" Niles Pyramid Type
30' x 12" Niles Pyramid Type

BRACKS—LEAF TYPE

8' x 16" Drels & Krump

BRACKS—PRESS TYPE

8' x 12" Geo. A. Old

10' x 12" Superior Hydraulic—NEW

12' x 12" Superior Hydraulic—NEW

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton R&M 40' Span 220/3,600 A.C.

Floor Control—New 1955

5 ton Whiting 48' Span 230/3,600 A.C.

5 ton Shaw 50' Span 230 Volt D.C.

10 ton P&H 38' Span 230 Volt D.C.

10 ton R&M 40' Span 220/3,600 A.C.

15 ton P&H 48' Span 230 Volt D.C.

15 ton P&H 72' Span 230 Volt D.C.

120 ton Niles 68' Span 440/3,600 A.C.

DRAW BENCH

10,000± Aetna Standard, Length of Draw 44". Used

to draw SAE 1035 Welded Steel Tubing

FORGING MACHINES

1" to 5" Acme, Atlas, National

3" Acme Model XX, Air Clutch, NEW 1954

HAMMERS—BROAD DROP—STEAM DROP—STEAM

FORGING—800 lb. to 20,000 lb.

LEVELER—STRETCHER

100 ton Hyd. Stretcher Leveler, Capy. .032" Ga.

36" Width, 96" Length; 4 Sheets in a Pack

LEVELERS—ROLLER

48" Aetna Standard, 17 Rolls 3 3/4" Dia.

54" McKay, 17 Rolls 3 3/4" Dia.

PRESSES—HYDRAULIC

750 ton Baldwin Triple Acting Bolster 84 x 133"

1200 ton United Steam Hydraulic Forging Press

4500 Baldwin-Lima-Hamilton Hydr. Forging Press

PRESSES—HYDRAULIC WHEEL

600 ton N-B-P, 96" Between Strain Bars

800 ton N-B-P, 96" Between Strain Bars

PRESSES—STRAIGHT SIDE

Version 81-40 200 ton 30" Stroke, Bed 40" x 41"

Bliss 280 300 ton, 16" Stroke, Bed 41" x 83"

Toledo 203E Overhanging 18" Str. 38 x 40" Bolster

Cleveland Style EP Single End, 42" Throat

Cleveland Style G Single End, 60" Throat

Cleveland Style W, 60" Throat

No. 1 1/2 Buffalo Universal Ironworker

ROLLS—FORMING

M-11 Yoder 10 Stand, Roll Shaft 1 1/2"

Model 14 L-M-1 Tishken Roll Forming Machine

1 1/2" Dia. Spindle, 3 1/2" Capacity, With Cut-Off

ROLLS—PLATE STRAIGHTENING

12" Bertsch Seven Rolls 7" Dia.

72" Hillis & Jones, Six Rolls 11" Dia.

ROLLING MILLS

9" Bar Mill

18" Three High Bar Mill

10" x 14" Single Stand Two High

12" x 12" Single Stand Two High

12" x 16" Single Stand Two High

16" x 24" Farrel Two Stand, Two High

16" x 30" Single Stand, Two High

20" x 38" Single Stand, Two High

26" x 72" Cold Rolling Mill

44" x 144" Three High Sheet Mill

22" x 40" Three High Sheet Mill

SHEAR—ALLIGATOR

No. 1 Mesta RII I.R. Capacity 2" x 12"

SHEARS—SQUARING

8' x 10" Ga. Niagara No. 672

8' x 12" Niagara—NEW 1952

10' x 12" Niagara—NEW 1950

12' x 12" Cincinnati

16' x 16" Long & Alstatter

SHEAR—MISC.

Lomes Flying Shear with ratchet driven measuring

rolls, Capacity .125" x 36" wide

SLITTERS

12" Blake & Johnson

21" Blake & Johnson

36" Wean Slitting Line

32" Stansbury Slitting Line

STRAIGHTENERS

Kate & Rouch Type B, Capy. 3/4" Hex., Flat

4" x 11/32" Flat & Edge 1 1/4" x 3 1/2"

SWAGING MACHINE

2 1/2" A. Fem. Capacity 2 1/4" Tube, 3 3/4" Solid 10"

Die Length Hydraulic Feed, LATE

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72" Hanchett 3-spd. rotary surface, new 1948.

14" x 36" Pratt & Whitney hyd. vert. surface, 1942.

No. 74 Heald hyd. pl. Internal, X-sliding H. S., 1941.

16" x 36" Landis type C hyd. pl. cylindrical, 1942.

HAMMERS

No. 3C Chambersburg pneumatic, serial No. 2297.

No. 6-1 Nazel, pneumatic, late.

No. 6B Nazel, self-contained.

LATHES

No. 3 Gisholt Univ. Turret Lathe (2), 1942.

No. 5 Gisholt ram type Univ. Turret Lathe, 1940.

15" x 30" Lipe Carbo-Matic, 1942.

126" x 96" CC Niles Bement Pond engine lathes, 80

HP, M.D.

MILLING MACHINES

No. 2 Brown & Sharpe vertical mill, new 1943.

No. 5-48 Cincinnati hydromatic duplex mill, serial

3BSIDK-5.

No. 2-24 Cincinnati automatic simplex mill, serial

No. 1B3PIT-1.

PRESSES

200 ton No. 7-72 Bliss S.S. D.C. Press, Air Clutch.

350 ton Elmes self-cont. 4-post Hydraulic Press, 1944.

500 ton No. 1039 Hamilton D.C. adj. bed, 60"x102"

800 ton Model 2E-46-800 Hamilton, S.S. air clutch,

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2600 ton No. 6 National Maxipress Forging Press.

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36" Rockford hyd. vertical slotter, new 1944.

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1 1/2" National Upsetter, guided ram, hard ways.

3" Ajax upsetting & forging machine, air clutch,

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SLIP RING MOTORS

Constant Duty 3 Phase 60 Cycle

Q.	H.P.	R.P.M.	Make	Type	Volt
1	100	430	Al. Ch.		220/440
3	100	495	Al. Ch.	IM-13A	2300
1	100	570	G.E.	MT-562	220/440
1	100	870	Whse.	CW	220/440
1	100	900	Ed.Dy.	EDX412	2300
1	100	1160	Whse.	CW	220/440
1	100	435	Whse.	CW1009	220/440
1	150	490	Whse.	CW	220/440
1	150	585	Whse.	CW	4160/2200
1	150	705	Al. Ch.	ANY	220/440
2	200	490	G.E.	IM-14	2200
2	200	585	G.E.	IM-18	2200
1	200	1760	G.E.	IM-13B	2200
1	250	300	G.E.	MT-414	2200
1	250	705	Al. Ch.	ANY	220/440
1	350	450	G.E.	MT-412	2200
1	400	290	Whse.	CW	2200
1	400	595	Al. Ch.	ANY	2200
1	450	440	Whse.	CW	2200
1	500	450	G.E.	IM	2300
2	500	505	Al. Ch.	ARY	2300
1	700	295	Whse.	CW	2200
1	750	400	G.E.	IM	2200
1	1000	445	Whse.	CW	2200
1	1500	360	G.E.	Mill type	2300
1	1800	270	Whse.	Mill type	6600/4000
2	2500	257	G.E.	Mill type	2300

SYNCHRONOUS MOTORS

3 phase-60 cycle

Q.	H.P.	R.P.M.	Make	Type	Volt
1	2500	720	Whse.	8 PF	2200/4160
1	2000	900	Whse.	8 PF	2200
1	1500	514	Whse.	8 PF	2200
1	1000	1200	Ed. Mech.	8 PF	440
1	1000	900	G.E.	8 PF	2300
1	710	720	G.E.	8 PF	440/2300
1	450	128	Whse.	1.0 PF	2200
2	300	720	G.E.	TS 982	440/2300
2	300	600	G.E.	TS 7656	2200
2	280	900	Cr. Wb.	8 PF	2300
1	250	600	Whse.	8 PF	220/440
1	200	514	Al. Ch.	1.0 PF	2200
1	200	450	G.E.	8 PF	440
1	200	360	Al. Ch.	1.0 PF	440/2300/4
1	150	860	G.E.	ATY	2200
1	150	720	Ed. Mech.	8 PF	220/440
1	150	600	G.E.	TS 7641	550
3	135	900	G.E.	TS 963	4000/2200
1	125	900	Ed. Mech.	1.0 PF	4800/2400
1	125	900	G.E.	TS 7556	2200
2	100	1800	Whse.	8 PF	220/440
1	100	900	Ideal	8 PF	220/440
2	100	600	G.E.	TS 7641	220/440
1	100	900	Ed. Mech.	1.0 PF	220/440

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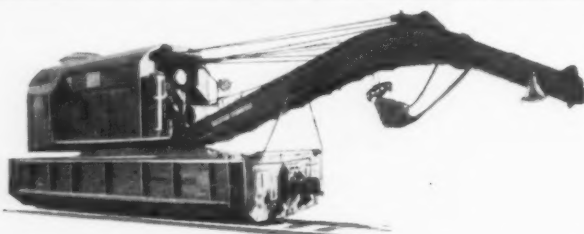
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- 1-KANE & ROACH BAR AND ANGLE STRAIGHTENER, size 25, cap. 4" x 4" x 1/2" angles, 5" channels, 2 1/2" bars.

- 2-KANE & ROACH BAR AND ANGLE STRAIGHTENERS, size 24, cap. 3" x 3" x 3/8" angles, 3 1/2" channels and 2" bars.
- 1-23 MEDART STRAIGHTENER, capacity 1" to 4 1/2" dia. bars, tubes. With 50 HP motor, extra rolls.
- 1-21 MEDART STRAIGHTENER, capacity 1/2" to 2 1/2" bars, tubes, extra rolls.
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- 1-1200 HP MOTOR, 2200 volts, 3 phase, 60 cycle, 1253 RPM.
- 1-500 HP MOTOR, 2200 volts, 3 phase, 60 cycle, 514 RPM.
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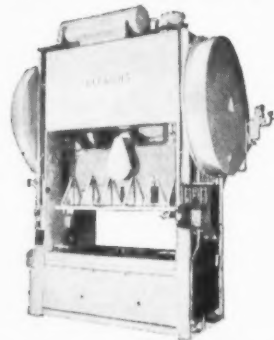
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Qu.	H.P.	Make	Type	Volts	RPM
1	2200	G.E.	MCF	600	400/500
3	1375	G.E.	MCF	415	1300
1	1000	G.E.	MCF	600	350/700
1	840	Whse.	QMI	250	140/170
1	800	Whse.		300	250/550
With United Gear Set 7:1 Ratio					
1	500	Whse.	CC-216	600	300/900
1	450	Whse.		550	415
1	300	G.E.	MPC	250	400
1	250	G.E.	MPC	230	400/600
1	200	Whse.	CB-5113	250	400/800
1	200	Whse.	CB-207.4	250	850/1200
1	150	G.E.	SK-181	600	250/700
1	150	Cr. Wh.	65-H	230	1150
2	125	Whse.	SK-185	230	350/1050
1	125	Whse.	SK-183	230	850
2	100	Whse.	SK-181	230	450/1000
1	60/100	G.E.	RF-17	230	450/900
2	75	Cr. Wh.	55H TFFC	230	860
1	50	G.E.	MD-412-AE	230	550
6	40	Rel.	35-P TFFC		
			BB	230	500/1500
2	30/40	Whse.	SK-131.5-BB	230	500/1500

MG SETS — 3 Ph. 60 Cy.

Qu.	KW	Make	Type	RPM	Volts	AC
2	2000/2400	G.E.		450	250/300	2300/4600
1	2000	G.E.	25 cy.	660		11000
1	2000	G.E.	514	600		2300/4600
1	1500	G.E.	720	600		6000/13200
3	1000	G.E.	720	600		6000/13200
2	1000	G.E.	514	600		6000/13200
1	750	G.E.	720	125/250		2300/4600
1	500	G.E.	900	540/540		4150
1	500	Whse.	900	125/250		440
2	300	G.E.	1200	250		2300
2	300	Whse.	1200	275		440/2300
1	200	Whse.	1200	550		2300

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Volts
1	3000	A.C.	OISC	3	33000 x 2300
1	1500	G.E. auto	HT	3	4000/4200/4400
3	1000	G.E.	HVIDI	1	2400 x 480
3	1000	G.E.	OA, FA	1	13800 x 250/460
1	833	G.E.	H	1	13800 x 460
2	750	G.E.	Pyranol	1	4800 x 85/55
3	500	Kuhl.	OISC	1	13200 x 6600
1	500	G.E.	OISC	1	13200 x 2300
1	500	G.E.	HS	1	13800 x 600
1	300	G.E.	HT	3	4160 x 480/277
3	250	L.M.	OISC	1	13800 x 240/120
1	200	G.E.	Auto-cooled	3	432/480 x 120/208Y
3	150	G.E.	OISC	3	33000 x 2300/4000Y

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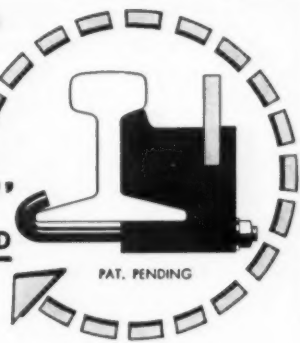
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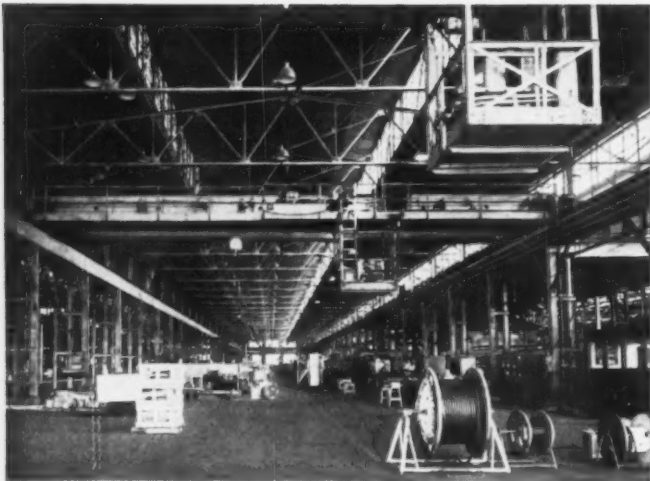


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More Loans For Small Firms

The U. S. Senate and House agreed upon an extra \$80 million fund to be made available in loans to small firms. Since July 1, 1956, the SBA has loaned \$137 million to small firms. It now needs the extra \$87 million to meet the rising credit demands of small businessmen. The SBA now has a total lending authority of \$455 million. This includes funds for disaster loans and prime contract authority.

House Questions Funds For Minerals

Lawmakers from the West are alarmed at action by the House appropriations committee which dropped subsidies for four federal mineral-buying programs. The committee denied a request for \$30 million to prolong buying of tungsten, asbestos, fluorspar, and columbium-titanium through June 30.

Woodward Strike Enters 4th Month

A strike of 700 transportation and blast furnace workers at Woodward Iron Co., Birmingham, Ala., has entered its fourth month with no sign of a settlement. Woodward operations shut down last Nov. 1, idling more than 2,500.

Ingalls Wins Contract For Atomic Subs

Ingalls Shipbuilding Corp., Birmingham, Ala., was awarded a contract by the U. S. Navy for construction of two atomic submarines totaling \$40,998,770. This does not cover cost of reactors by which they will be propelled. The first keel will be laid early in December at Ingalls' Pascagoula, Miss. yard.

Railroads Get New Rate Boost

Shippers in all parts of the country are faced with new, higher freight charges. The government granted southern rail lines a 5 pct emergency rate increase. This boost is part of a total 15 pct rate advance asked by all but two southern roads. Eastern and western lines, meanwhile, seek to raise their rates a total of 22 pct. The total would include previously granted increases of 7 pct for eastern and 5 pct for western roads.

Steel Firm Files For Reorganization

Northeastern Steel Corp., Bridgeport, Conn., is seeking to reorganize under Chapter 10 of the National Bankruptcy Act. The company expects to continue production without interruption. A petition filed with the U. S. District Court in New Haven was accompanied by notice that the firm would default on interest payments due on its 6 pct debentures. Meanwhile, the Connecticut Bank and Trust Co. filed suit asking appointment of a receiver for the corporation. The bank also seeks foreclosure of a mortgage and damages of \$6 million. Northeastern, a producer of specialty steels, reported a net loss of \$1,154,422 in the first nine months of 1956.

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ENGINEERING COMPANY**

"THE HAMMER BUILDERS"

262 Derbyshire Street

Chambersburg, Pa.

STOP RUST
on large
or small

Save up to 75% of
Galvanizing costs with Z.R.C. . . .

Z.R.C. is applied by brush or spray, therefore, you can galvanize any object of any size or shape—from ship, bridge or tower to garden equipment!

Cost—averages 1½¢ per sq. ft.!

Z.R.C. contains 95% pure zinc, will withstand over 3000 hour salt spray test, is equally effective over new metal or wire brushed rust, comes ready mixed, has unlimited shelf life and does not require constant stirring.

Z.R.C. dries in 30 minutes to a gray matte finish—the coating is tough, flexible and firmly adherent—may be built up to any thickness.

GALVANIC PROTECTION STARTS ON CONTACT AND LASTS! For price, ordering information and technical data write to

the **SEALUBE** company

14 VALLEY ST. WAKEFIELD, MASS.

REPRESENTATIVES WANTED

B.F. Goodrich report:



Hurricane of sand roars through hose

B. F. Goodrich improvements in rubber brought extra savings

Problem: To clean rough spots off metal, the workman is using a blast of sand that roars out of a hose nozzle at terrific speed. Efficient for cleaning, but the hurricane of sand was wearing holes through every kind of hose tried on this job.

What was done: When a B.F. Goodrich man heard about the trouble, he recommended a hose, specially developed by B.F. Goodrich to stand this rough treatment. Extra-soft rubber is used for the lining of this sand blast hose, so the sharp, destructive sand simply bounces off the rubber instead

of digging in and cutting it to shreds.

Savings: The B.F. Goodrich hose has been on this job 3 years now—longer than any hose used before—and it shows no sign of wearing out.

Extra benefits: It is much lighter than sand blast hose used to be, more flexible, easier for workmen to handle. And there's no danger of workmen being shocked or jolted by static electricity, generated by sand rushing through the hose. Antistatic rubber carries away electric charges as fast as they build up.

Where to buy: Your B.F. Goodrich

distributor has exact specifications for the B.F. Goodrich hose used in this sand-blasting job. And, as a factory-trained specialist in rubber products, he can answer your questions about all the rubber products B.F. Goodrich makes for industry. B.F. Goodrich Industrial Products Co., Dept. M-862, Akron 18, Ohio.

B.F. Goodrich
INDUSTRIAL PRODUCTS



Another large tonnage steel producer looks to single stack furnaces for better annealing

**"Highly pleased," say
operators of pilot installation
of 6 Lee Wilson furnaces**

The swing to Single Stack furnaces for big coil annealing is gathering momentum with each new order placed by leading steel producers.

A large Eastern mill was the latest to break a long standard multiple-stack precedent by purchasing a pilot installation of Lee Wilson Single Stack furnaces for purposes of comparative testing.

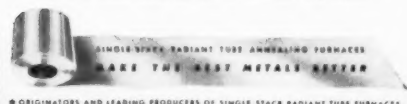
Early results indicate that the Single Stacks easily outproduce the older style furnaces per base and per man. What's more, the quality of the steel has never been better. "Highly pleased," say operators of the pilot installation.

If you don't already have the facts on this modern method of annealing, let Lee Wilson engineers put you in touch with those who have operated both types.

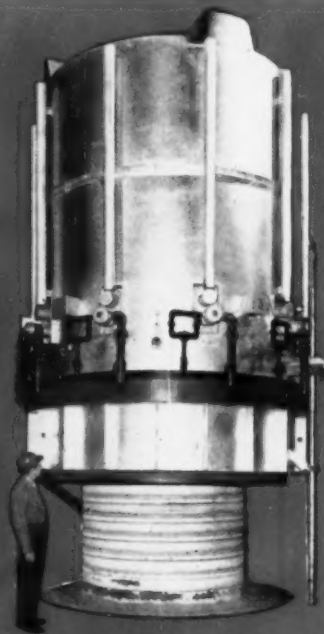
Lee Wilson

ENGINEERING COMPANY, INC.

20005 WEST LAKE ROAD CLEVELAND 16, OHIO



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The photograph (left) shows a general view of the pilot installation consisting of 6 furnaces and 15 bases. Above is a close-up of one of the furnaces being lifted from a charge.

WORLD'S LARGEST

Mechanical Double Action Press . . . by

This 2500 ton capacity mechanical double action press weighs over 1,000,000 pounds, has a bed and ram area of 90" (F-B) by 208" (R-L) . . . another example of the design and engineering leadership that makes Verson first in presses.

VERSION ALLSTEEL PRESS CO.
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